THE FOUNDRY for MAY 1945

VOLUME 73 NUMBER 5

Editorial Staff

FRANK G. STEINEBACH
Editor

PAT DWYER
Engineering Editor

EDWIN BREMER
Metallurgical Editor

WILLIAM G. GUDE
Associate Editor

DON S. CADOT
Art Editor

New York . . . . . B. K. PRICE, L. E. BROWNE
Chicago . . . . . E. F. ROSS
Detroit . . . . . A. H. ALLEN
Pittsburgh . . . . . R. L. HARTFORD
Washington . . . . . L. M. LAMM
London . . . . . VINCENT DELPORT

Advisory Staff

JOHN W. BOLTON
ALBERT E. GROVER
JOHN HOWE HALL
N. K. B. PATCH
HARRY A. SCHWARTZ

Business Staff

J. M. LATHROP
Advertising Manager

G. E. LORENZ
Manager, Circulation Department

New York . . . . . J. F. AHRENS
Chicago . . . . . G. A. POPE
Cleveland . . . . . A. L. KLINGEMAN
Los Angeles . . . . . F. J. FULLER

Main Office

Penton Building, Cleveland 13, Ohio

Branch Offices

New York, 17 . . . . 16 East 43rd St.
Chicago, 11 . . . 520 N. Michigan Ave.
Detroit, 2 . . . . . 6560 Cass Ave.
Los Angeles, 4 130 N. New Hampshire Ave.
Pittsburgh, 19 . . . Koppers Building
Washington, 4 . . National Press Building
London . . . . . 2, Caxton St. Westminster, S.W. 1.

THE FOUNDRY is published monthly by THE PENTON PUBLISHING CO., Penton Building, 1213 West Third Street, Cleveland, O. EARL L. SHANER, President and Treasurer; GEORGE O. HAYS, Vice President and General Manager; RUSSELL C. JAENEKE Vice President; FRANK G. STEINEBACH, Vice President and Secretary, and EDITH L. WERNER, Assistant Treasurer.

Subscription: In the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $2.00; three years, $5.00. Single copies 25 cents. Copies published three months or more previous to date of current issue, 50 cents.

Member: Audit Bureau of Circulations, Associated Business Papers, National Publisher's Association. Copyright 1945 by THE PENTON PUBLISHING CO.

Entered as second class matter at postoffice at Cleveland under the act of March 3, 1879.

	Page
Editorial	83
What About Your Test Bars? A SYMPOSIUM	84
Humanics in the Foundry By RALPH L. LEE	88
Comparative Properties of Cast and Forged Steel By C. E. SIMS	90
Gating, Risering and Chilling of Magnesium Sand Castings By A. CRISTELLO	94
Black Light Inspection of Aluminum Castings By E. V. BLACKMUN and EDWIN BREMER	96
Centrifugal Casting Speeds (Part II) By DR. J. E. HURST	100
China Needs Raw Materials By E. K. SMITH	101
Plant Modernization Increases Malleable Production By WILLIAM G. GUDE	102
Injuries and Accident Causes in the Foundry (Part III) By FRANK S. McELROY and GEORGE R. McCORMACK	106
Melting 80% Ferromanganese in Cupolas By JOHN HOWE HALL	107
Gray Iron Castings for Power Plant Equipment (Part I) By PAT DWYER	108
Friction Sawing Is Old Process in Foundry Field By H. J. CHAMBERLAND	125
Around Detroit—Inadequate Foundry Control Charged By ARTHUR H. ALLEN	128
Precision Castings Discussed at Chicago Conference By ERLE F. ROSS	135
Cleaning Castings on Mass Production Basis By E. B. RICH	148
The Adventures of Bill By PAT DWYER	202
Applies Warm Water in Blasting Cores from Castings By RICHARD W. VOSLAMBER	216

Questions and Answers	112	Foundry Group Activities	158
Men of Industry	118	Readers' Comment	190
Foundry Developments	132	Equipment and Supplies	236
Industry Briefs	140	Washington Notes	246
Obituary	142	New Trade Publications	257
Foundry Data Sheet	145	Where-to-Buy Directory	288

Index to Advertisers 304

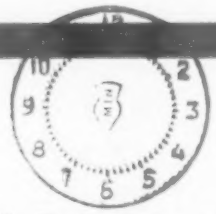
A MILLION WHEELS made with LINOIL by GRIFFIN WHEEL CO IN 1944

THE WERNER G.

(DIVISION OF ARCHER

2191 WEST 110 STREET WOODBINE

MAY 3 1945



RECEIVED
RESEARCH LABORATORIES
LIBRARY

Foundry Industry Has Postwar Selling Job

RECENTLY three inspectors of a large automobile producer appeared before the Detroit Chapter of the A.F.A. and discussed quite critically the difficulties their organization has been experiencing in obtaining good castings from a wide variety of sources. Figures were included to show a heavy financial loss because of defects in castings which, in many instances, were not discovered until a certain amount of machine work had been completed.

This presentation originally was developed for the foundry committee of the commercial organization, and criticisms applied to the foundries operated by the corporation as well as jobbing foundry suppliers. At the time of the presentation before the foundry committee of the corporation, a well known foundryman of the district also explained in some detail the reasons for many of the difficulties which had been encountered. A brief discussion of both presentations appears on page 128.

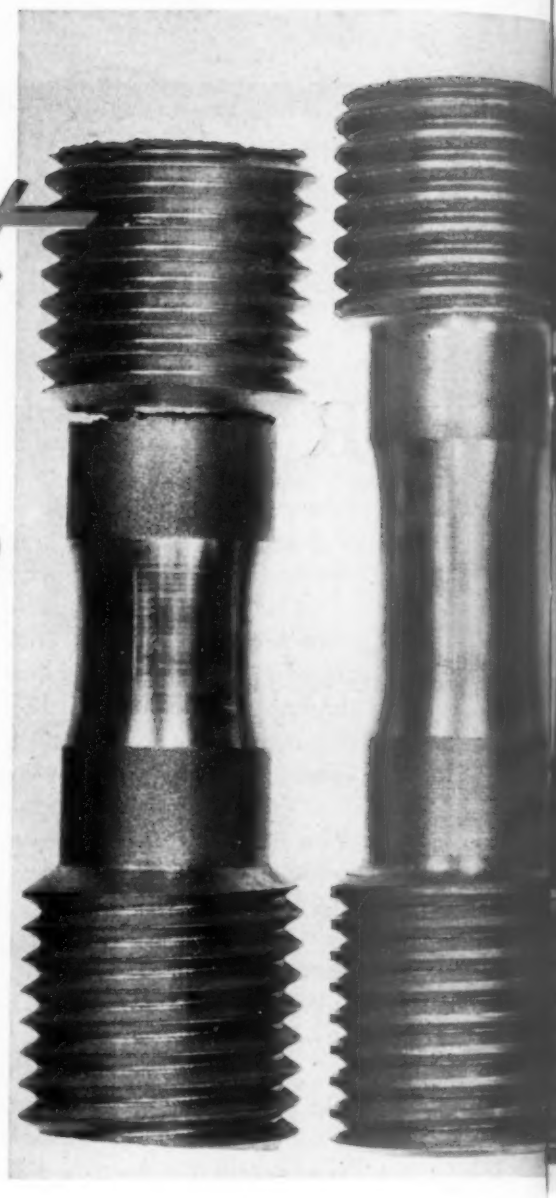
The writer of this page was present at the chapter presentation and believes the discussion of the three inspectors served a most useful purpose in acquainting foundrymen present with problems and criticisms of one of the largest buyers of castings for war production. It is to be regretted that circumstances prevented the Detroit foundryman from being present to repeat his discussion of underlying causes, and that a one-sided report of the meeting, including the criticisms of the foundry industry, was published in a periodical whose major circulation is among customers of foundries.

Taking all factors of war production into consideration, the foundry industry can take great pride in its tremendous service to the nation and the Allied cause. Had it not been possible to produce castings in huge quantities, victory surely would not be as near as it seems today. But pressure production always brings difficulties. With demands for castings far in excess of the ability of men and the capacity of machines to produce, with foundrymen frequently called upon to make castings outside the field of their experience, with evergrowing shortages of manpower and increases in the percentage of inexperienced help, and with other operating handicaps, a certain amount of dissatisfaction between producer and consumer is not surprising. As we move further into the reconversion period, foundrymen should make every effort to eliminate these rough spots.

These discussions and criticisms of castings probably are only indications of problems which will confront foundries in the days ahead. As war production declines, many foundries again will find it necessary to sell their castings against strongly organized competing products. Successful postwar market development requires a selling effort which will give buyers a better understanding of the value of castings as engineering materials, and will convince them of the ability of an unhampered industry to produce uniform quality products.

Frank G. Steinbach
Editor

What About Your Test Bars?



ARE serviceable gray iron castings being rejected simply because carelessness or lack of understanding enters into the pulling of test bars?

Although the proper procedures for making tensile tests on gray cast iron bars have been discussed from time to time and specifications of the A.S.T.M. outline proper methods, the question regarding present day rejections due to careless testing practices recently was raised again. In a letter to the editors of THE FOUNDRY, a foundry metallurgist of long and varied experience in the industry stated that too many foundries do not exercise sufficient care in determining the tensile strength of gray iron test bars. His comment in part is as follows:

"In pulling a test bar of steel, bronze, or other ductile metal, it is not so important to have the holders or grips in the heads of the tensile testing machine truly *axial*, whereas in pulling a test bar of a metal like gray iron it is necessary to have the holders *truly axial*. If this precaution is not taken, eccentric loading will result and the operator might as well break the bar over his knee. A low tensile strength will be recorded, the inspector will reject a perfectly good gray iron casting, and the war effort will be hindered."

Standard Specifications for Gray Iron Castings, A 48-41, gives the following procedure for the tensile strength test: "Tension test specimens shall fit the holders of the testing machine in such a way that the load shall be axial. The use of self-aligning shackles is recommended (Note 8)." Note 8 states: "The use of ball and socket holders in the tensile strength test is recommended. Tests made under conditions where eccentric loadings may occur will give erroneous results."

Our metallurgist correspondent insists this language is entirely too mild to register with many foundrymen. He believes there are some who disregard entirely the instructions, and then yell bloody murder because the so-and-so inspector rejected his casting.

In order to determine if the situation with regard to eccentric loading of gray iron test bars is as serious as our correspondent indicated, the editors relayed his comments to a number of well known foundry metallurgists who have been interested in testing problems, and asked for comments. The response has been most generous, and the editors take this opportunity to thank all who have contributed to this discussion, whether or not their communications have been included in this presentation. At the same time, it is hoped that other foundrymen interested in the problems presented in this round-table discussion will feel free to forward to THE FOUNDRY their ideas and experiences in the matter of test bars and tests.

Many of the comments are reproduced in this issue. It will be noted that most of those participating in the discussion feel that while axial loading of cast iron test bars is either necessary or desirable, the instructions of A.S.T.M. specifications and the practice in the majority of foundries are such that the problem probably is not as serious as the comments of our metallurgical correspondent would

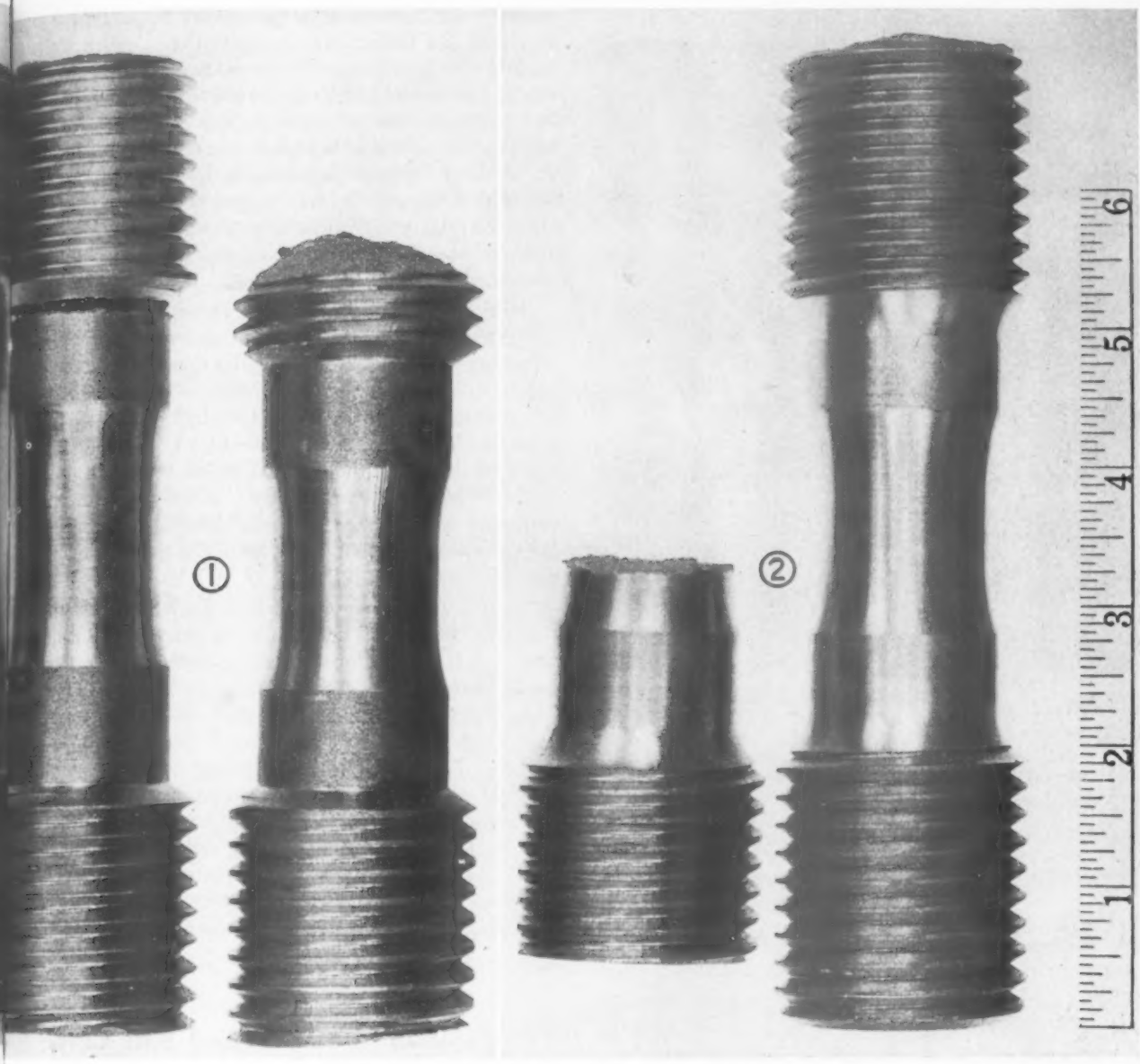


Fig. 1—Showing the effect of improper machining at junction of gage length and threads. Fig. 2—Bars with ample fillet at start of gage length

indicate. But practically all agree that the pouring and preparation of test bars do not receive the attention which their importance justifies, and that foundrymen would do well to give the entire problem more attention.

One comment includes the following: "When walking on a slippery street one naturally exercises more caution than when walking on a dry pavement. Likewise when testing cast iron one exercises more care than when handling a more ductile material."

But do we, when the entire industry is considered?

Methods of Machining and Threading Test Bars Highly Important

By W. C. BLOTT and W. A. HAMBLEY
Allis-Chalmers Mfg. Co., Milwaukee

PHYSICAL testing of cast iron in tension requires more attention than other critical materials and it seems that many times factors affecting the ultimate strength are overlooked, or more or less condoned. This appears to be due more to a lack of understanding of the tremendous advances made in cast iron over the old sash weight and manhole cover days than to any other factor.

Class 20 and 30 irons, while important, did not lend themselves to critical testing technique, as a few thousand pounds more or less did not appreciably alter the results. Nor was the engineer or designer over-critical of the failures, as it was generally good enough for the application. The uses of cast iron were based on a 10 to 1 safety factor by such codes as the A.S.M.E., Bureau of Ships and other agencies. If not limited by codes, the thinking was still based on these lines.

When high strength irons became more prominent and used, the testing technicians failed to keep on the alert for small details which affect the ultimate strength. For example, true axial loading is essential and necessary for testing brittle or less ductile materials and while the testing machine in itself may be perfect, other factors affecting the loading are overlooked.

Methods of machining and threading of test bars and

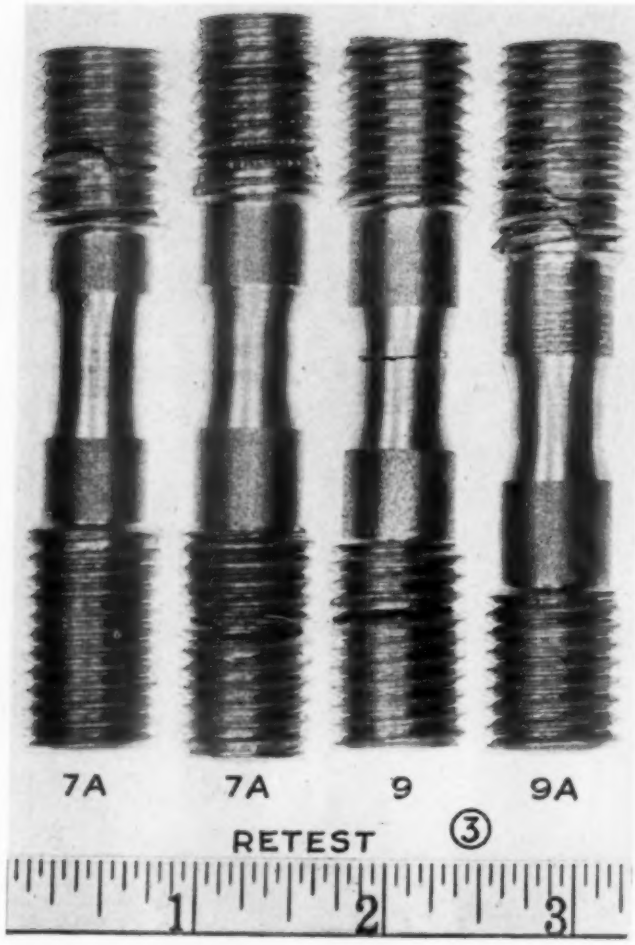


Fig. 3—Showing failure of bars due to dull thread chaser

grips are tremendously important although they are frequently overlooked. Fig. 1 shows a number of 2-inch tensile bars which were machined to the 1.250-inch cross section. These bars are from class 60 iron and all broke in the heavier sections. As machined and pulled, these bars showed only 45,000 pounds per square inch average instead of 60,000 pounds per square inch. You will notice the 90 degree angle at the start of the threads left by the tool in machining. This produced a notch effect causing the bar to break much lower. While most authorities claim cast iron is not notch sensitive as is steel, yet in high strength irons it has been found that conditions as shown cause failures. By changing the machining to a fairly large radius, as shown in Fig. 2, no more difficulty has been experienced.

Another example in this same class of iron was due to some dull threading chasers which permitted a small ridge to be formed near the root of the thread. This small ridge set up an eccentric loading condition producing stresses sufficient to cause cracking in the threads and subsequently failure. These failures, Fig. 3, occur where the cross sectional areas are much greater than in the gage length. Macrophotos, Figs. 4 and 5, at four magnifications show the cracks produced in the threaded area, and the macrophoto at four magnifications, Fig. 6, shows a cross section of the threaded portion. This is a definite example of eccentric loading producing low physicals in cast iron due to machining practice.

Another example of eccentric loading encountered occurred with the use of a two-screw, beam type testing machine. In testing high strength irons, which were all pulling very low, it was discovered that the bottom nut on one of the screws had worked loose and backed up slightly. This permitted the screw to lift up somewhat thereby tipping the moveable head and causing eccentric loading. In breaking duplicate bars on a hydraulic machine, it was found that the material was as specified, class 50 iron, yet these castings could have been scrapped for low tensile strength had not duplicate bars and a different type machine been available for checking.

A further example of eccentric loading was experienced in the use of special grips and sub-size test bars. Threaded inserts were made for the regular ¾-inch ball and socket specimen holders. The outside and inside threads were not machined truly axial and the slight eccentricity produced caused the majority of the bars to break low. This occurred even with the ball and socket device on the ends of the ¾-inch specimen holders. In checking for reasons of failure and finding the cause described, a new set of holders were machined truly axial and the duplicate bars passed.

These few examples of eccentric loading as actually encountered in practice serve to bring out the importance of testing and machining technique especially in irons of higher strengths. If threaded bars are not used, it would seem that it is very important that the bars be such that true axial loading can be effected, and nothing left to chance. The attitude of the operator that the machine is all right and nothing can happen adversely there, or the machinist, that his work is perfect, must be changed to one of alertness for anything that may happen. The attitude that cast iron is a simple, not too important metal, with the consequent laxity of testing, must be overcome by facing the fact that here is truly a critical material to test.

Careless Pouring of Test Bars Cuts Apparent Strength Markedly

By TOM E. BARLOW
Battelle Memorial Institute, Columbus, O.

ALTHOUGH we cannot deny that lack of axial loading in the pulling of a test bar in gray cast iron may have some effect on the ultimate results, we believe that the emphasis is possibly in the wrong place in any discussion of why an inspector could reject a gray iron casting on the basis of low test-bar results.

In 1937 *A.S.T.M. Proceedings*, (page 88), a paper by Draffin and Collins described experimental work with deliberate eccentric loading of cast iron specimens. They showed that during the early stages of loading with nonaxial pull, the specimen tended to align itself and relieve the superimposed eccentric condition. The result was that, although the few specimens tested in this manner showed somewhat lower tensile properties than those loaded axially, the difference was so small that they were unable to conclude that the eccentric loading caused the slightly lower values. Apparently, the effect of nonaxial loading, unless carried to extremes, is a relatively minor matter, and it is questionable whether the foundryman is often confronted with a situation in which such a small

difference in test results would provide grounds for rejection.

However, the subject of test bars in cast iron does require a great deal of thought. If the foundryman would devote half the attention to gating, molding, and designing test bars as he does to gating and molding of castings, there would not be so much difficulty from this source. A very high percentage of the test bars produced in this country are not representatitve of even mediocre foundry practice. Furthermore, entirely too many foundrymen have a habit of pouring test bars at low temperatures and without any attempt to eliminate dirt, slag, and other inclusions—to say nothing of ignoring such precautions as structure control.

If the foundryman would realize that pouring a test bar at a low temperature may lower the apparent strength of the material by 5000 to 10,000 pounds, and that inclusion of sand particles, blow holes, cold shot, hard spots, excessive chill, and type D graphite structures could completely ruin the results obtained on the test bar, there would be less tendency toward the rejection of good castings because of poor bars. Let the foundryman pour his test bar iron at the highest possible temperature incorporating correct structure control and inoculation, eliminate the possibilities of slag inclusions, cold shot, hard spots, and other foundry ills, and he will not have to worry too much about whether or not the test bar is tested axially or with some slight eccentricity.

Reproducibility of Methods Needed in Testing and Manufacturing

By CAPT. W. L. COLLINS
Ordnance Department, Jackson Heights, L. I., N. Y.

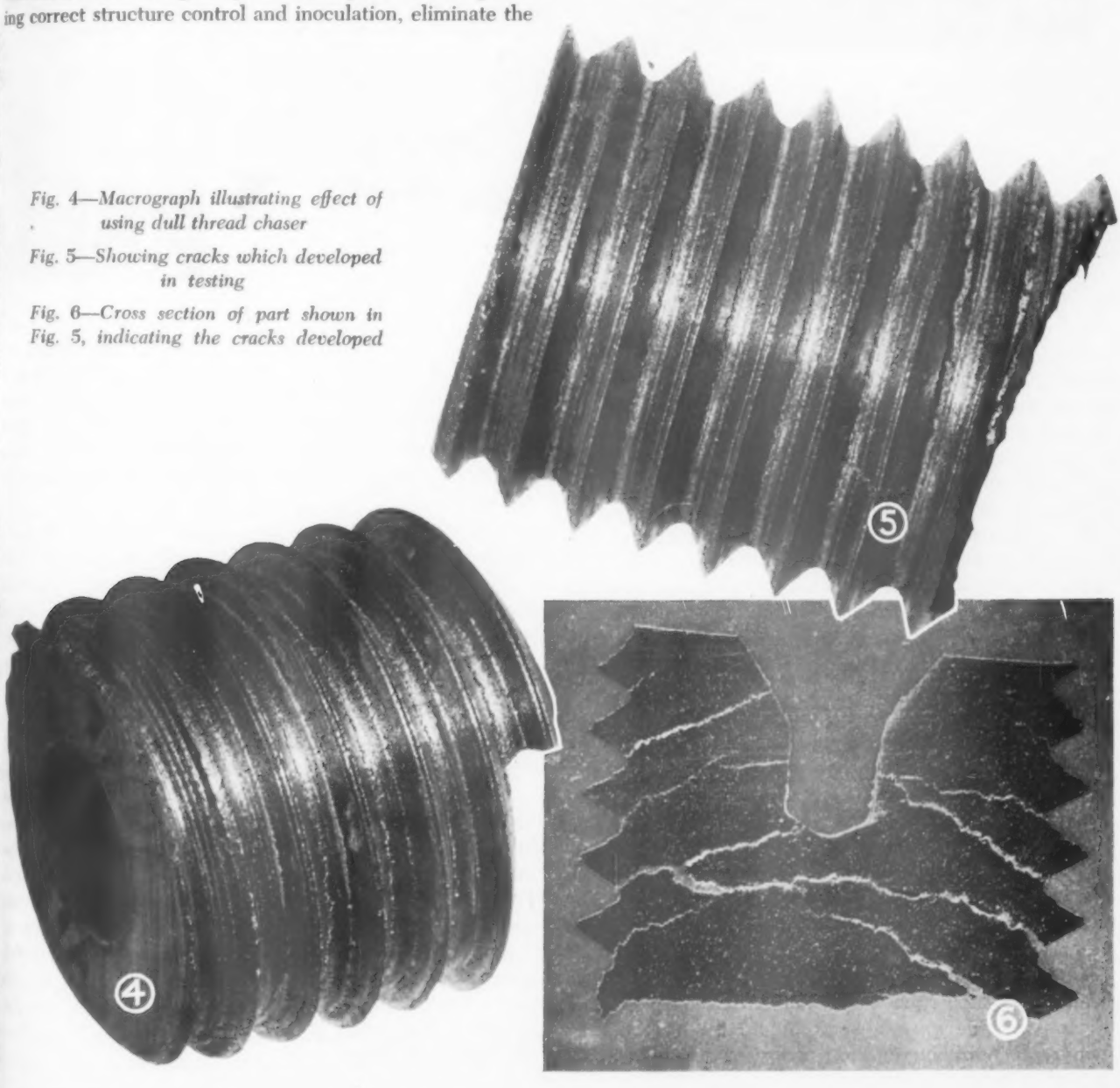
ENTIRELY too many people still believe cast iron to be a pile of stuff tossed in a pot, melted and poured in a hole in a pile of sand. Because of this misconception the loose thinking is carried over into the tests that are required for determination of physical properties, i.e. falsely believing that since the material is crudely made the tests should also be crude.

However, those who know cast iron—who know there are a great multitude of alloys giving widely different physical properties—who know (*Please turn to page* 150)

Fig. 4—Macrograph illustrating effect of using dull thread chaser

Fig. 5—Showing cracks which developed in testing

Fig. 6—Cross section of part shown in Fig. 5, indicating the cracks developed



Humanics in th

By RALPH L. LEE
General Motors Corp.
Detroit

ORDINARILY when I introduce a subject I have been asked to discuss, I eat humble pie to begin with, stressing my lack of qualifications with the hope that by contrast my message will seem to be better than it really is. However, in this instance such innocent deception would be entirely out of order, for I own and personally operate my own foundry with both ferrous and nonferrous products—pattern shop, too.

Then, too, it would be downright dishonest for me to pretend to hide my light of employe relations accomplishments under the bushel when throughout the entire period of labor agitation, strikes and what not, there was not even one single case of anything resembling an employe grievance in the Lee Foundry, in spite of the fact that the lowest wages on record are paid with nothing for overtime on a normal 15-hour day.

Why only last week the shakeout man, after working all day and night until three in the morning, came into my house with the kindliest feeling toward management. He helped himself to a snack from the refrigerator and also from a bottle I had hidden away in the cupboard. In fact, he sat down to breakfast with the family in the morning.

The bench molder and the proprietor see eye to eye on every subject, even that of no money for the payroll. The cupola and furnace tender use the family bathroom. While I must admit that our castings are inferior and we've never quite paid expenses, let alone make a profit, our employe relations are simply marvelous, that is for an organization of our size. And when it comes to size, there isn't another foundry organization in the country that can compare with us. As of Jan. 1, our total number of employes, including office force and pattern shop, was 1.0000. I represent the 1 on the left-hand side of the decimal point. That's me—the shakeout man, the bench molder, the floor molder, the metallurgist, the cupola tender, the pattern-maker, the general manager, the owner and the principal customer.

You see, our maximum heat of gray iron with the iron running out of the tuyeres is 0.03 tons—60 pounds—and by using a crucible extender, we have managed to pour 24 pounds of brass over the 24 hours on two shifts. Well anyway, we are outstanding in this respect—within arms reach in our Lilliputian foundry will be found all of the basic elements of the foundry from a power-driven riddle to the cupola with its drop bottom and stack sticking up through the roof and all housed in a little special building we call Plant I.

If I am permitted to choose, the first place I head for in visiting a foundry is the testing laboratory where I can see, admire and touch the various precision measuring instruments used. But on the many visits I have made to both foundries and factories, there is one instrument I have not found—the *humanometer*, an instrument with which to measure the permeability, the fineness or coarseness, the all wetness, the hardness, the strength, crystallization or boiling point of the most vitally important element in foundry practice—the *human element* without which all the other elements are useless.

n the Foundry

Human behavior should be just as predictable, measureable and understandable as behavior of the physical laws governing materials with which we work, according to Mr. Lee, who is widely known for his accomplishments in the field of employe relations. His remarks here are from an address given at the eighth annual foundry conference of the Wisconsin Chapter of the A.F.A. and the University of Wisconsin held in Milwaukee

Showing the author at work in the Lee Foundry where employe relations are no problem and the proprietor fills all the jobs. In two of the views the author's son is assisting in charging and tapping the cupola

Because there is no *humanometer*, or the human behavior facts such an instrument would make available, we are forced to deal with human relationships on the same guess and by-God hunch basis we abandoned in the field of mechanics years ago. With the result that there is one constant round of cat-and-dog fights between one gang who, without facts, try to force their guesses and hunches down the throats of another equally factless gang.

And yet, in spite of our seeming lack of measureable facts, we do manage most of the time to get our work out. Someone, somewhere must know something about human behavior or we couldn't have built the organizations which stare us in the face in every direction.

It is the suspicion that far more dependable, yet unrecognized facts, are lying around in the mental attics of practical shop people which has led me to take up my most important hobby of all—that is my collecting hobby. I am making a collection of second-hand or used facts regarding humanics in the shop which I gather from shop bosses who have proved they have something on the ball when it comes to giving the best and getting the best from their employes.

The collection is growing at an alarming rate; in fact, so fast that it is getting out of hand with more specimens coming than I have time to examine, let alone catalog or mount.

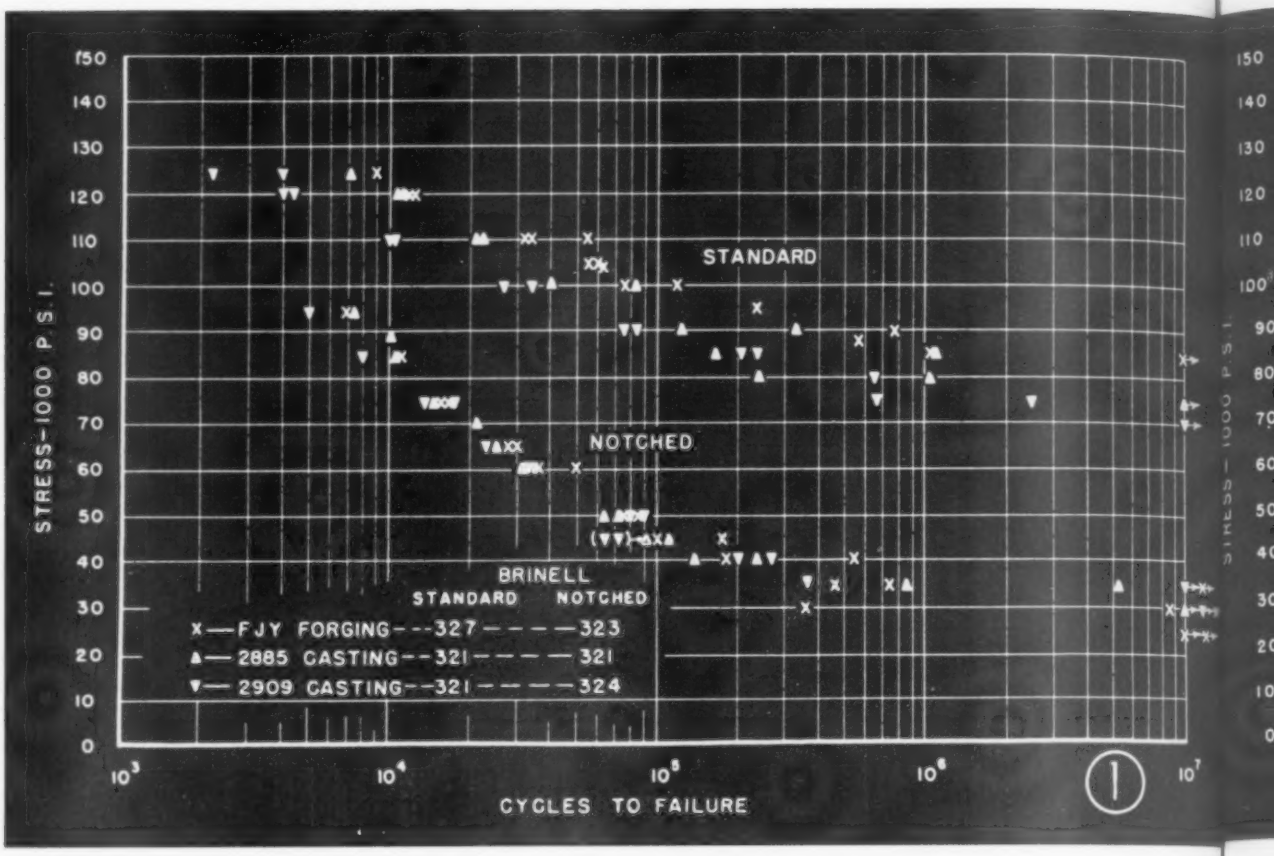
Like most important facts, the first one in my collection is simple and obvious. Here it is—

Fact No. 1—Everyone is different and the only one of his kind in the world. Almost every group of any size contains at least one *bully*, that type of individual who since he was knee-high to a grasshopper has been naturally inclined to try to force his way into a position he has not earned or is entitled to hold.

Like the Irishman who with a piece of paper in his hand walks up to the bar in an Irish saloon with a tougher and bigger Irishman already there. "And faith Pat," said the bigger to the smaller, "What do ye have on yer paper?" "Oh this, well me boy I have here a list of all the people I can lick." "Oh ye have, have ye?" said Mike, "and might I politely inquire would my name be happening to be on your list?" "I really don't know," said Pat, "but we soon shall see." And he scanned the list, "Well what do ye know, sure enough and here it is second from the last," said Pat. "Oh it is, is it?" said Mike as he started to peel off his coat. "Hold yer horses Mike and stay in yer coat, can't ye see that I'm crossin' yer name off me list."

Then, every group must contain at least one *smoothy*, that type of individual who from the time he was born was instinctively inclined to try at every opportunity to finagle his way into a position he had not earned and was incapable of holding if he did get it. The type who brought apples to the teacher when he was a kid or the one who now tries to cultivate those who are seemingly on the up-and-up at the neglect of those who are headed in the other direction.

We must have a *clown*—that lovable nincompoop—who is irresistibly inclined toward practical jokes. He is the habitual tickler of those unfortunates who are uncontrollably sensitive in a certain unmentionable part of the anatomy, the naturally inclined and hereditary clown who must have attention whether (*Please turn to page* 226)



Comparative Properties of CAST and FORGED STEEL

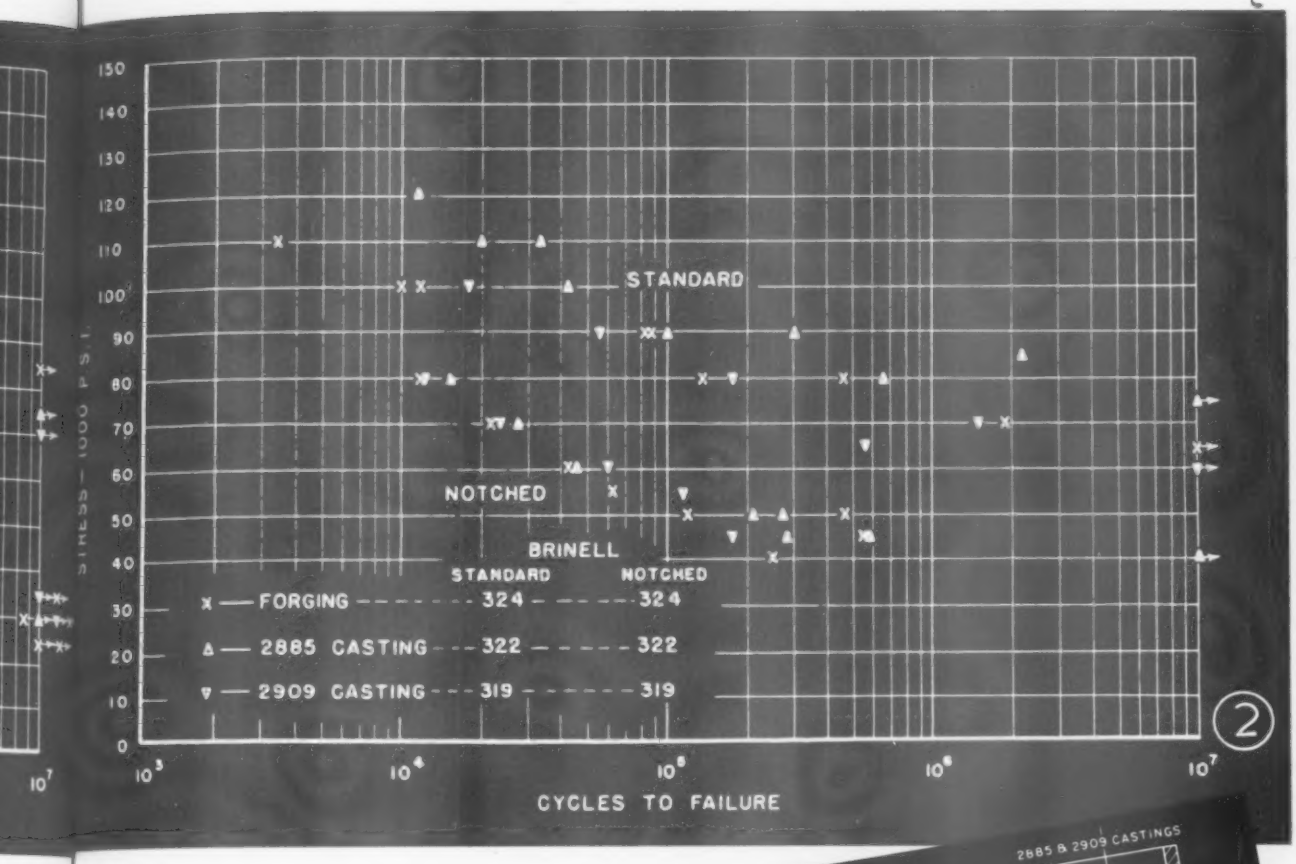
By C. E. SIMS
Battelle Memorial Institute
Columbus, O.

BEFORE aircraft were put into mass production, many of the steel parts were hogged out from solid steel stock. With the advent of mass production and assembly lines, these parts were redesigned, so far as possible, to be made as drop forgings, machine forgings, or hammer forgings. Many assemblies, such as landing-gear parts, were made by welding together forgings, forgings to tubing, etc. Such assemblies have been satisfactory in respect to service obtaned.

Because of the tremendous wartime demand for forgings, however, there developed a shortage in forging-quality alloy steel, in forging machine capacity, in die block steel, and in toolmakers. As a result, forgings were extremely hard to procure in a reasonable time, especially when changes in design required new die blocks. Some parts, moreover, were of such size and shape as to require complicated and expensive dies. (Expense here means man-hours of labor rather than dollars.)

One potential source of parts, and a means to break the bottleneck, was to substitute steel castings for forgings. The aircraft industry, on the whole, has had but little experience with steel castings, and the comparative properties of the two products were largely unknown. Individual aircraft manufacturers were taking steps independently to procure test castings, but, inasmuch as the problem is common to all producers, the subject was taken up with the War Production Board. WPB placed a contract with Battelle Memorial Institute to do research work, fundamental testing, and development of test methods. This work was under the direct supervision of the War Metallurgy Committee and under the general guidance of a committee composed of metallurgists versed in steel casting and of individuals with a knowledge of aircraft requirements. This article, based on excerpts from the restricted report Serial Number W-154, has been released for publication by the Office of Production Research and Development of the WPB.

Early in the project, a request was made to compare



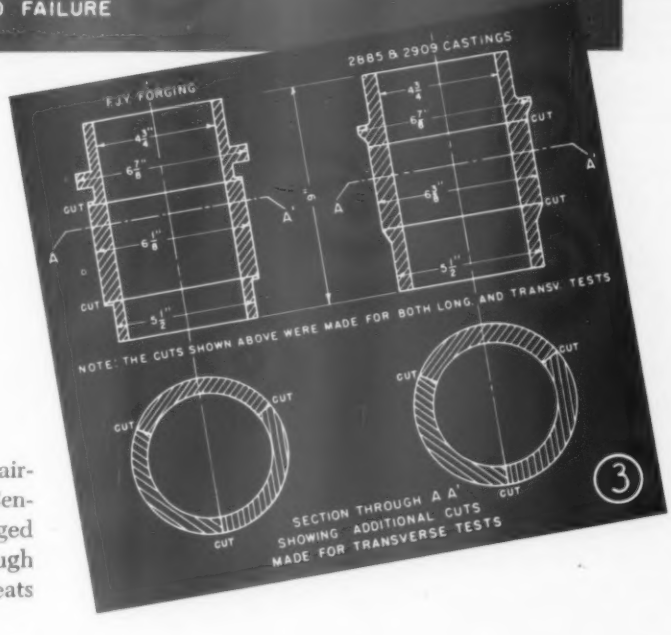

F.J.V. FORGING
2885 & 2909 CASTINGS
CUT
NOTE: THE CUTS SHOWN ABOVE WERE MADE FOR BOTH LONG. AND TRANSV. TESTS
SECTION THROUGH A A' SHOWING ADDITIONAL CUTS MADE FOR TRANSVERSE TESTS
3

Fig 1—S-N curves, standard and notched bars from forgings and castings, longitudinal

Fig. 2—Data from fatigue tests plotted to show transverse stress of forgings and castings

Fig. 3—Sketch showing how cylinder barrels were sectioned to obtain tensile and fatigue bars

the properties of forged and centrifugally cast aircraft engine cylinder barrels, especially in fatigue. Centrifugally cast barrels from two heats of steel and forged barrels from one heat of steel were procured in the rough machined condition. The compositions of the three heats are given in Table I.

All cylinders were heat treated according to current practice which consists of quenching in oil from 1550 degrees Fahr. and tempering back to a hardness of approximately 325 brinell. The barrels were then sectioned longitudinally and transversely, as shown in Fig. 3, to obtain tensile and fatigue bars. Tensile bars were standard 0.505-inch bars with threaded grips, while the fatigue bars were of the rotating beam type for the R. R. Moore machine. Both the smooth bar with 9¾-inch radius and the Kommers square-notch fatigue bars were used.

The tensile bars were broken on standard hydraulic machines, while the fatigue bars were tested in R. R. Moore rotating beam machines running at 10,000 revolutions per minute. Data on the tensile tests are given in Table II, while the data from the fatigue tests are plotted in Figs. 1 and 2.

In the tension data of Table II, the higher composition of Heat 2885 will account for its slightly higher strength. In comparing the forgings with castings of Heat 2909 which are very similar in composition, it is interesting to note that, although the forgings show somewhat better longitudinal properties, they are inferior in the transverse test. The average of both directions for the forging is the same as for the casting. The principal difference, therefore, is that the forging has directional properties which are absent in the castings.

Fatigue tests were run to exhaustion of available stock, but it is apparent that more data in the lower stresses would have been helpful. In interpreting these data, no general conclusions can be drawn. Only indications can be observed in data of forgings from one heat and cast-

TABLE I—Composition of Cylinder Barrel Heats

Heat No.	C, %	Mn, %	P, %	S, %	Cr, %	Mo, %	Si, %	Remarks
FJY-SC503	0.41	0.74	0.015	0.037	0.89	0.20	0.20	Forging
2909	0.42	0.74	0.030	0.030	0.93	0.18	0.41	Casting
2885	0.45	0.86	0.027	0.042	1.06	0.20	0.47	Casting

TABLE II—Physical Properties of Tests on Cylinder Barrels*

Specimen	Orientation	Elong., in 2 in., %	Red. of Area, %	Yield Point, 0.2% Offset	Ult. Str.	Bhn
FJY	Long.	13.4	59.2	88,150	136,650	323
FJY	Trans.	11.7	38.2	106,800	141,770	323
2909	Long.	13.2	47.6	95,250	138,350	324
2909	Trans.	11.7	47.2	94,300	137,700	324
2885	Long.	13.3	46.6	126,100	156,300	321
2885	Trans.	13.3	48.8	116,500	153,400	321

*Results shown are from single test bars.

TABLE III—Composition of Experimental Heats

Heat No.	C, %	Mn, %	Si, %	Cr, %	Mo, %
9349	0.36	0.44	0.38	0.97	0.28
9413	0.42	0.91	0.34	1.00	0.33
9467	0.24	0.69	0.22	0.98	0.21
9650	0.37	0.69	0.36	1.02	0.25

TABLE IV—Average Mechanical Properties

Condition	Bhn	Tensile, psi	Elong. in 2 in., %	Red. of Area, %	Charpy ft-lb
Cast unsound	320	122,800	1.5	5.7	12.5
Cast sound	313	145,100	12.5	36.6	16.5
Cast unsound, forged	316	149,200	10.5	28.2	18.3
Cast sound, forged	320	152,900	15.5	48.7	22.5

TABLE V—Heats Cast Into Forging Blanks

Heat No.	C, %	Mn, %	Si, %	Cr, %	Mo, %
0	0.33	0.45	0 22	0.98	0.27
1	0.33	0.93	0.34	1.02	0.31
2	0.33	0.88	0.33	1.04	0.25
4	0.35	1.32	0.23	1.03	0.25

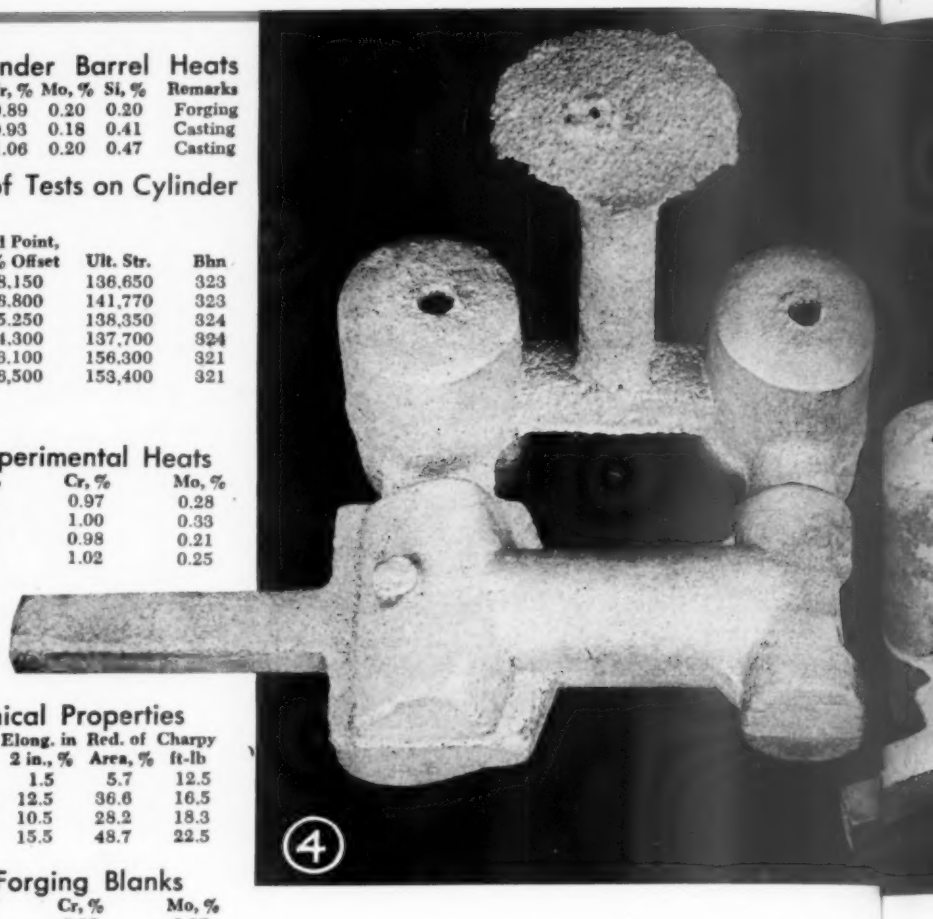


Fig. 4—Showing method of casting the forging blank.
Fig. 5—Showing improved method of casting the forg-

ings obtained from two different heats.

Considering the width of the scatter band as an indication of integrity and reliability in the steel, it will be observed that, for all steels, they are very narrow, and that there is little to choose between the steels in this respect. In the notched bar tests, the scatter bands are even narrower, which may be taken to indicate that the notch itself is more important than minor differences in the steels.

Although the endurance limits were not definitely established, they are indicated roughly by the S-N curves. Again, as in the tensile tests, the forgings seem to have a slight advantage in the longitudinal tests which is lost in the transverse tests. All in all, however, the results are so closely similar that, so far as these tests are concerned, no superiority can be shown for either the forged or the cast steel.

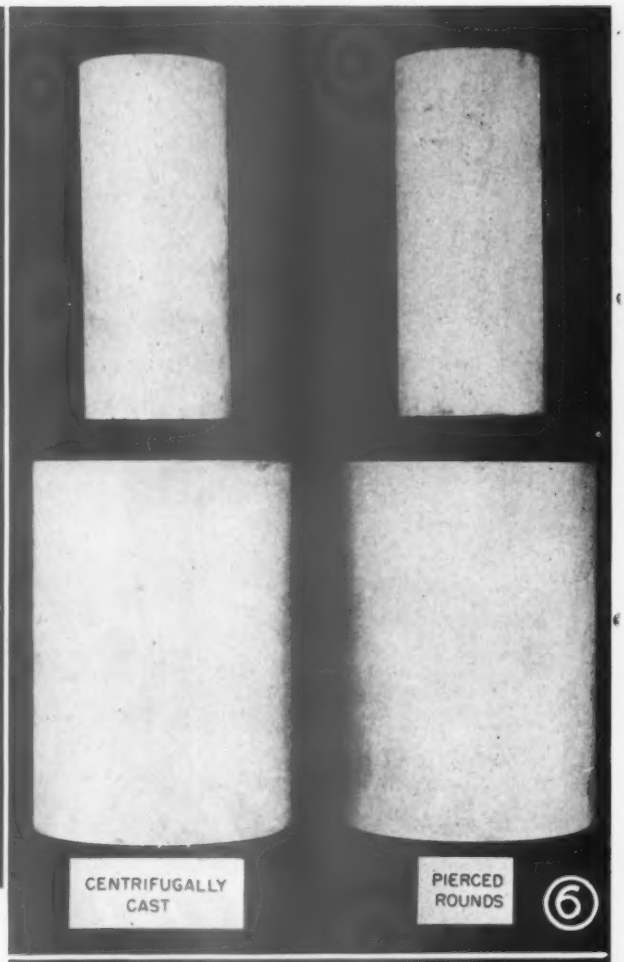
One method that has been proposed to relieve the strain on forging facilities is to cast forging blanks that will approximate, in shape and size, the rough forging before it enters the last impression of the die block. Two advantages would be gained, it is argued. Smaller die blocks with fewer impressions would be needed on one hand, and the hot working would improve the mechanical properties of the part so that it would more closely resemble forged steel than cast steel, particularly if the castings were not sound in the first place.

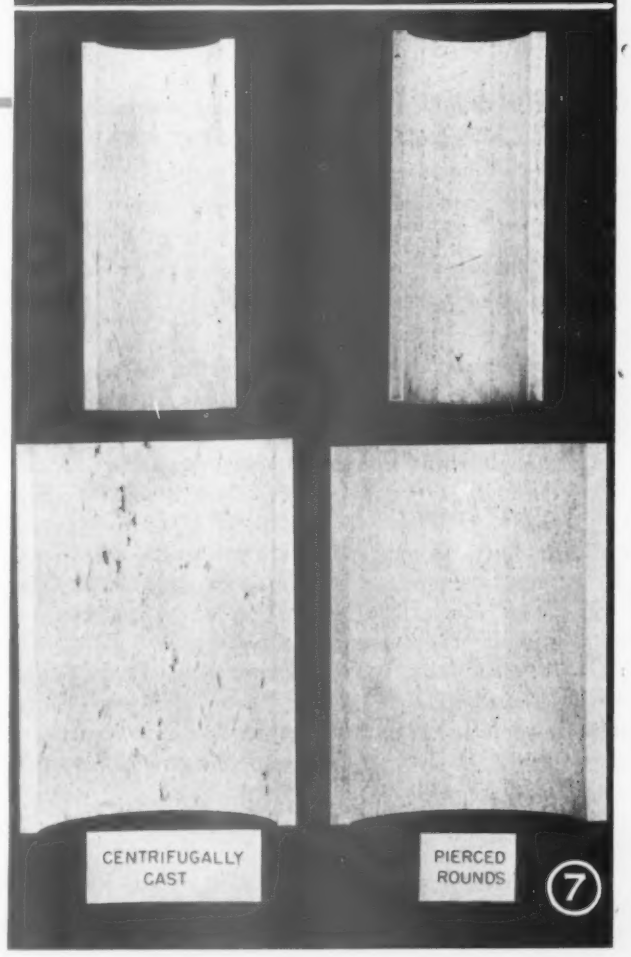
Captured German materiel, both ordnance and aircraft, contains many forgings from alloy steels, customarily high in chromium and often high in manganese, that show a cast dendritic structure very little broken up by forging. The inclusions likewise show that only a small degree of hot working has been applied. Casting a blank nearly to size and forging in only one die, thus appears to be the present standard German practice, even for very important and highly stressed parts. In some cases, parts normally so made have been found in which the cast blank was machined to size and not forged at all.

With the expectation, later verified, that such a process would show increased output per hammer, it was decided to make a short study on the technical aspects, particularly in regard to the properties of the products.

The first experimental work consisted of casting some 1¼-inch square steel bars in S.A.E. 4100 steel with carbon ranging from 0.24 to 0.42 per cent. Half of the bars were cast sound, while the rest were purposely cast with bad center-line shrinkage. Part of these were forged lightly, and then all were heat treated and machined to tensile and Charpy test bars. The composition of the steels used and the average properties for all the conditions are shown in Tables III and IV.

Macroetched sections showed that the forging tended to close shrinkage cavities. These tests, as conducted,





ing blank. Fig. 6—Outside surfaces of tubing as macro-etched. Fig. 7—Inside surfaces of tubing as macroetched

show a considerable improvement produced by light forging in the unsound bars and a lesser improvement in the properties of the sound cast bars.

In order to obtain a more comprehensive test, an aircraft part from a wrought steel blank was borrowed from a local forge shop and used as a model for a pattern. The pattern was made very similar to the finished forging, except that it was oversize in the vertical dimension (as forged) and a tong hold was added. Castings made from this pattern were then forged in the same die block as the model.

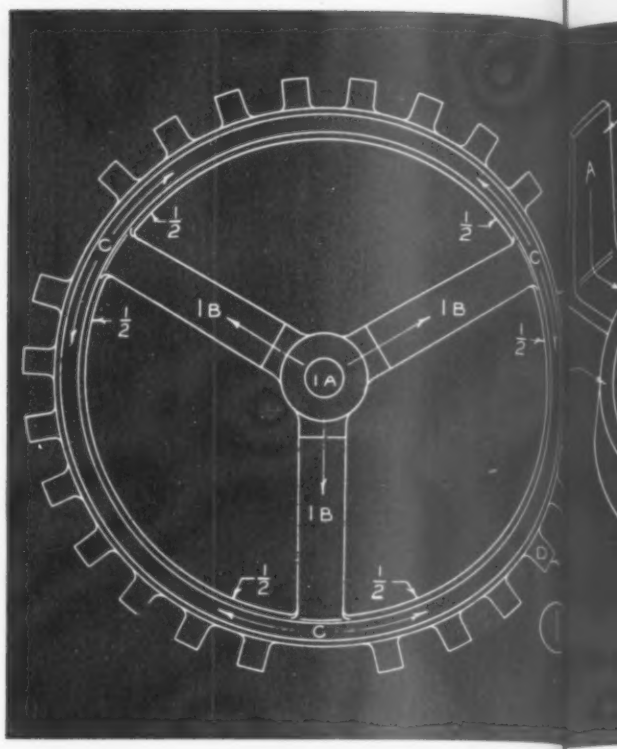
The forging blanks were first cast as shown in Fig. 4, using the blind riser principle of feeding. This was found to give an unsound casting, and to obtain some entirely sound, the risers were changed as shown in Fig. 5. Typical of the heats made are those listed in Table V.

Heat No. 0 was cast in a manner to give an unsound casting while the rest were cast sound. The slight amount of forging given these castings tended to close up the shrinkage cavities. The result of the experiments showed that a sound forging blank is desirable.

One cast and one cast-and-forged specimen from each of Heat Nos. 1, 2 and 4 were heat treated as follows: 1850 degrees Fahr., 4 hours—air cooled; 1650 degrees, 2 hours —water quenched; 950 degrees, 6 hours—air cooled.

This left them with a hardness (*Please turn to Page* 192)

By A. CRISTELLO
Manager, Foundries
Eclipse-Pioneer Division
Bendix Aviation Corp., Teterboro, N. J.



GATING... RISERING... AND CHILLING OF Magnesium Sand

FOREWORD... **Information, sketches and outlines under the title "Gating, Risering and Chilling of Magnesium Sand Castings," as published herein, were delivered originally in the form of a technical paper at a War Production Board meeting of the Magnesium Sand Casting Section, Aluminum and Magnesium Division, held in Cleveland, Nov. 29-30, 1943. The paper was read at the request of the WPB with the intention of disseminating information which might be of value to the magnesium foundry industry and thus possibly help the war effort.**

Up to this time, there had been no intention of publishing this information, but due to many and continuous requests, the author finally consented to this publication in THE FOUNDRY. There are no revisions or additions in this publication as compared to the Cleveland presentation except for notes and clarifications necessary to render the paper suitable for publication purposes.

GATING, risering and chilling of magnesium castings have been one of our problems and, I think, yours too. However, I believe that gating has been more of a problem than risering and chilling. So, after many years of magnesium foundry experience, we at Eclipse-Pioneer foundries came to a conclusion about one year ago that we could standardize on gating and be successful. In the following, I shall give the general principles used for small, medium and large castings:

I. The Gate

1—*Size of the Gate*

(a) Thickness of the gate should be slightly larger than the wall thickness of the casting where gates are placed, so that the gate will feed the casting during solidification.

(b) Width of the gate should be about three times the thickness of the gate.

(c) Length of the gate should be slightly larger than the width of the gate.

2—*Number of Gates*

(a) Space between the gates should be twice the width of the gates, which will determine the number of gates to be applied. The space allowance is to provide a bearing for core setting between gates, if such is the case, as well as to flow metal into the casting as uniformly as possible; insuring uniformity of metal temperature entering in all gates and resulting in equal cooling provided heavy sections are properly risered and chilled.

Most of you foundrymen, I suppose, walk through your plant, just as I do, and watch a big job being poured. You look into the risers of the mold, see the metal coming up and starting to turn black in color, and know that oxidation is taking place. The reason oxidation takes place is that the flow time has been retarded. It tells you that you must increase the choked sprue area in order to get a faster metal flow time.

3—*Location of the Gates*

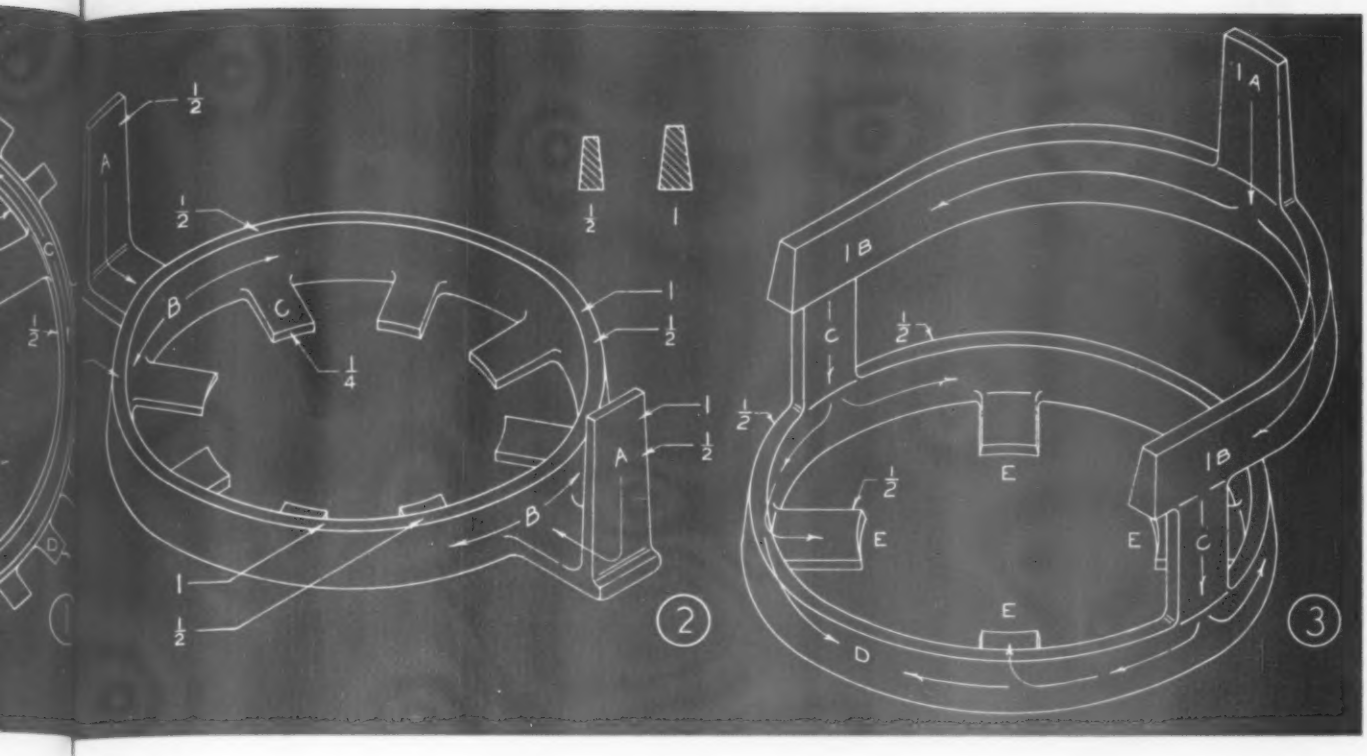


Fig. 1—Inside gate for large casting. Each of three feeders has same volume capacity as the sprue at the choke
Fig. 3—Area gate for deep casting, showing relationship between cross-sectional areas of various runners
Fig. 2—Area gate for two-ladle pouring setup. Also can be used as illustration for one-ladle pouring setup, using same type gate

Castings

(a) All gates where possible especially on large work where metal has to drop 3 inches or more from the drag parting line, should be located uniformly at the bottom of the casting to insure best results. Bottom gating gives a smoother flow of metal and less chances of oxidation, oxide skins or pin holes.

(b) In some cases, the casting is best gated from the end because of directional solidification. In a uniform wall casting gated from one end, the metal is lowest in temperature when it reaches the far end and, therefore, solidifies there first. The metal solidifies at the gate last because of the hot metal, and also because the sand has been heated more at that point by the passage of the metal.

II. The Runner

1. *Size of the Runner*

(a) Cross-sectional area of the runner should be the same as the total cross section of the gates to keep the same volume of metal in the runner as is in the gate.

2. *Shape of the Runner*

(a) The runner should be three to four times as high as it is wide to trap oxide and dross in the upper part of the runner, as well as to feed the gates upon solidification.

3. *Location of the Runner*

(a) The runner should extend from the base of the gate upward in order to trap dross, oxide and sand in the upper part of the runner.

III. The Sprue

1. *Size of the Sprue*

(a) Cross-sectional area of the sprue should be one-half to one-quarter the total area of the gates. The size of the sprue determines the pouring time.

2. *Shape of the Sprue*

(a) The sprue can be rectangular or round in shape on small castings, both types of which can easily be choked. That prevents the metal from swirling in the sprue.

(b) The sprues on large castings are rectangular but sometimes oval sprues are used so as to choke up more quickly. There are cases where oval sprues and rectangular sprues are used in conjunction with each other on the same casting.

IV. The Screens

1. *Use of the Screens*

(a) Screens are used on all sizes of castings, especially where there is a large volume of metal to make sure that all oxide and fluxes are trapped.

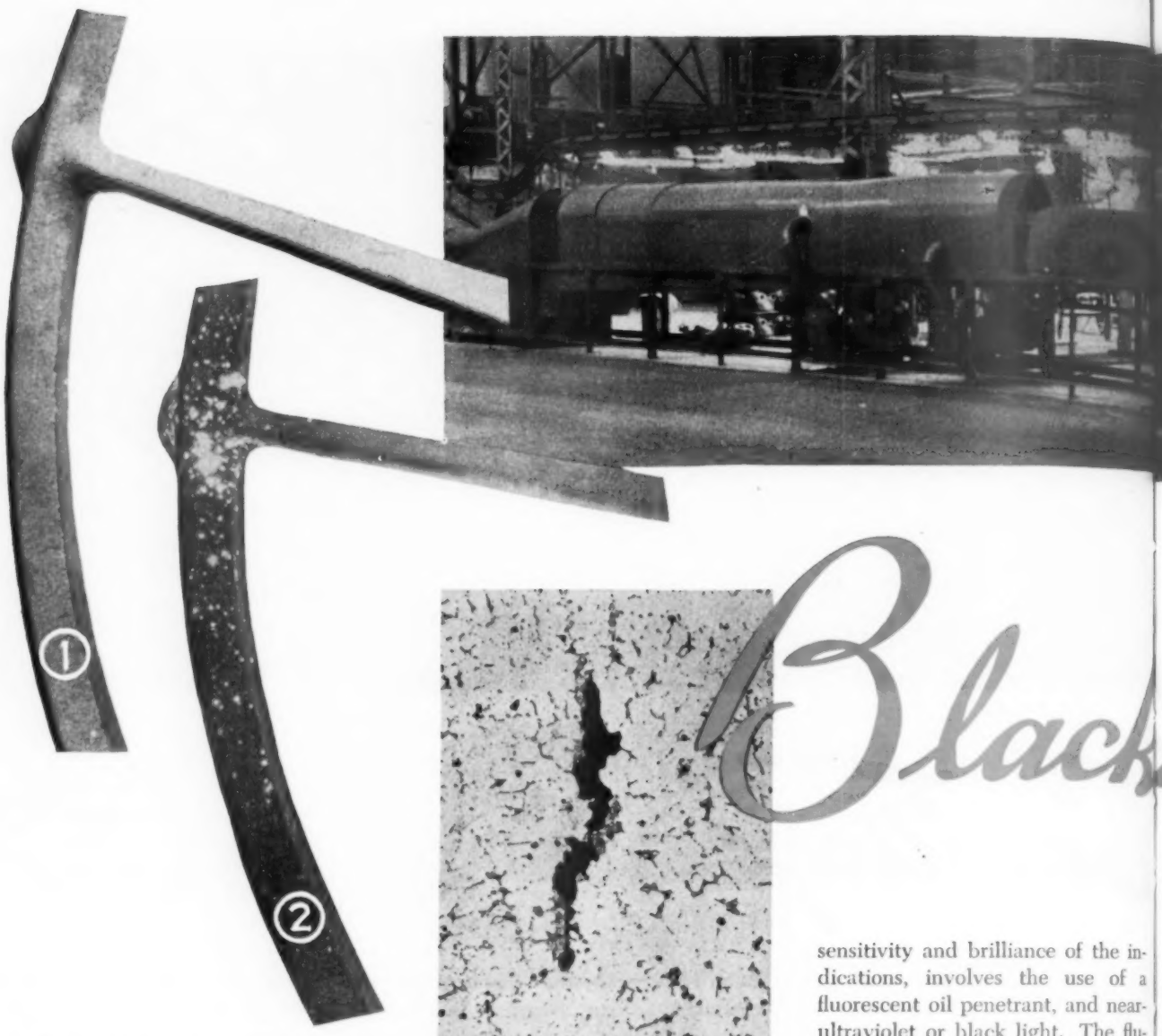
V. The Choke

1. *Location of the Choke*

(a) The choke is always at the base of the sprue so that a solid wall of metal is formed from the top of the mold to the base of the sprue. After the metal passes through the choke, it flows quietly through the runner and gates and into the casting with the minimum amount of pressure.

VI. Pouring Time

1. Pouring time of the casting is determined by the size, type, wall thickness, and amount of metal poured. The pouring time should be such as to allow metal to flow into the casting and rise at a normal (*Please turn to page* 254)



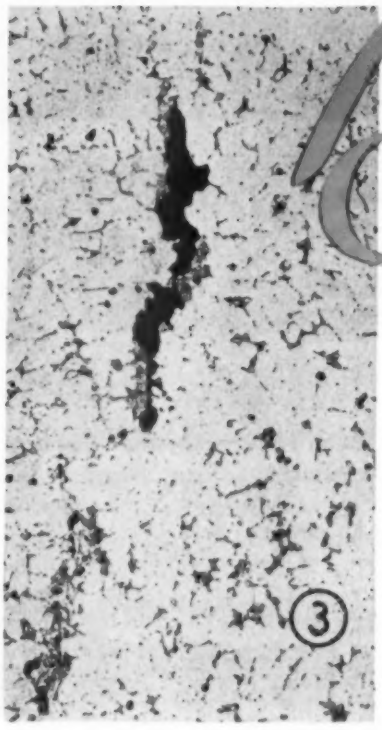


Fig. 1—Section of an aluminum casting photographed in visible light

Fig. 2—Same casting shown in Fig. 1 photographed under black light indicating shrinkage porosity

Fig. 3—Micrograph of one area of shrinkage shown in Figs. 1 and 2

Black

ONE difficulty encountered in detection of dross films and surface cracks in aluminum and magnesium alloy castings was the lack of sensitivity of inspection procedures. One of the oldest methods employed for that purpose was use of oil and whiting whereby the castings soaked in kerosene, low grade gasoline or light machine oil were washed with a suitable solvent and dusted with chalk, talc or whiting. The oil, kerosene or gasoline was retained in the fine cracks and porous areas, and was absorbed by the chalk or whiting, showing up as damp or wet spots which could be detected visually. However, sensitivity was deficient because of the lack of contrast between the dry and wet whiting or chalk on the surface of the piece. The exact size and location of the defective portions were not shown with any accuracy.

A new procedure similar in principle to the oil and whiting method, but which achieves a major increase in the sensitivity and brilliance of the indications, involves the use of a fluorescent oil penetrant, and near-ultraviolet or black light. The fluorescent penetrant or black light method involves immersing the parts to be inspected in the penetrant for several minutes, removing the excess by draining, and washing, and then dusting the part with a light coat of talc. The latter withdraws and absorbs the fluorescent oil from the surface discontinuities and provides optimum conditions for examinaation of the part under near-ultraviolet or black light.

Fluorescence which appears only under ultraviolet light is quite intense and exhibits a high degree of contrast between those surface imperfections which retain oil, and the sound surface which does not hold the oil. Contrast as measured by a photometer is approximately 2000 to 1 as compared to the greatest contrast between black and white which is not more than 100 to 1.

Prime requisite of the fluorescent liquid is that it have good penetrating characteristics. As penetration is accomplished through capillarity involving wetting ability and surface tension of the material, a penetrant with a very low contact angle and a strong affinity for metals is preferable. Many mineral oils fluoresce, and the degree of fluorescence under ultraviolet light is in proportion to the viscosity of the oil. Hence, heavy oils and greases fluoresce

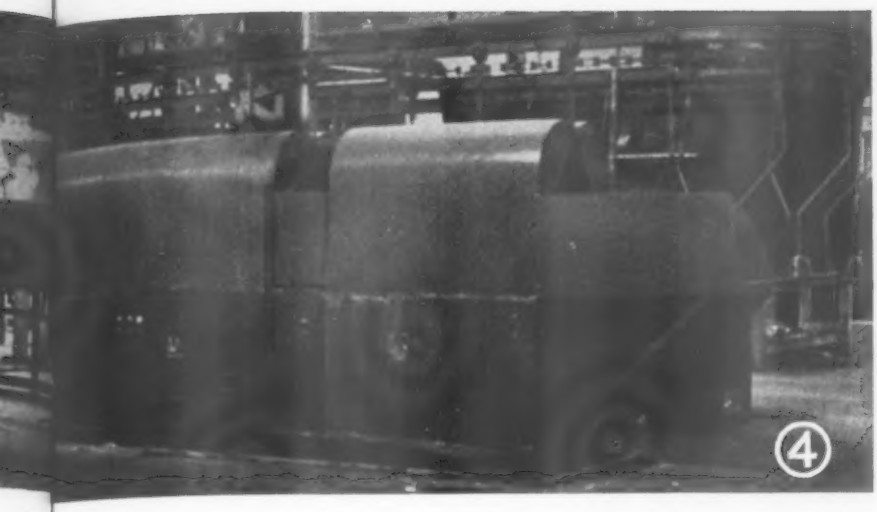


Fig. 4—Modern equipment in a large aluminum production foundry for applying penetrant, washing and drying the castings. Black light inspection booths are located behind

By E. V. BLACKMUN
Aluminum Co. of America
and
EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

Black Light Inspection OF ALUMINUM CASTINGS

more intensely than light oil. However, heavy oils have poor penetrating characteristics, and the degree of fluorescence of light oils is of a low order. Some success has been obtained with heavy oils by heating them to reduce their viscosity. Elimination of those difficulties has been accomplished by use of an oil solution of a soluble fluorescent dye which, when excited by ultraviolet light, fluoresces more highly than any heavy oil alone.

Applied in Various Ways

Soluble oils are particularly suitable as penetrating solvents for the fluorescent material since the excess is removed readily from the surfaces of the parts by washing with water. Surface tension of such oils may be reduced and their penetration increased by dilution with a petroleum solvent such as kerosene. The penetrant may be applied in various ways depending upon the size of the parts being inspected. Small castings in baskets may be immersed in a tank of the oil solution which makes possible inspection of a large number at the same time.

Parts may remain in the basket until they are removed for inspection under black light at the end of the treatment. Large parts may be painted or sprayed. It is advisable to allow the parts to soak in the penetrant from 1 to 15 minutes depending upon the size of the cracks. Fine cracks require a longer time than wide cracks, and an average of 10 minutes should be satisfactory for most parts. The articles need not be immersed in oil during the impregnation period since that will occur during draining. The parts may be placed on a drain board for penetration, and the excess material returned to the dip tank for further use.

Since no contrast will exist between the defect and sound surface unless the excess penetrant is removed, washing is accomplished by high-pressure water spraying. The soluble oil on the surface is emulsified and flows away easily, but due to its high surface tension the water has poor penetrating characteristics, and does not wash the fluorescent oil from the cracks, shrinkage or porosity. Complete washing is essential in the case of sand castings, since oil may be retained in the surface roughness on the casting and the true defects completely hidden or masked. However, with high-pressure spraying no difficulty should be encountered. Die castings and permanent mold castings may be washed satisfactorily with cold water, but high-pressure spraying is preferable.

After washing the parts are dried in air. Where hot water is used for washing the parts will dry rapidly in still air while in the case of a cold water wash, the parts can be dried in warm circulating air.

To make the defects highly visible under ultraviolet light it is necessary to draw the fluorescent liquid from the cracks to the surface. While this occurs to some degree as natural seepage, the action is accelerated by applying a finely divided powder such as powdered talc or fly ash. Either functions as a blotter, drawing the penetrant from the surface discontinuity and preventing it from spreading widely on the surface. Powder is applied by dusting or rolling the part in the powder to provide a thin surface layer. After application of the powder the casting or

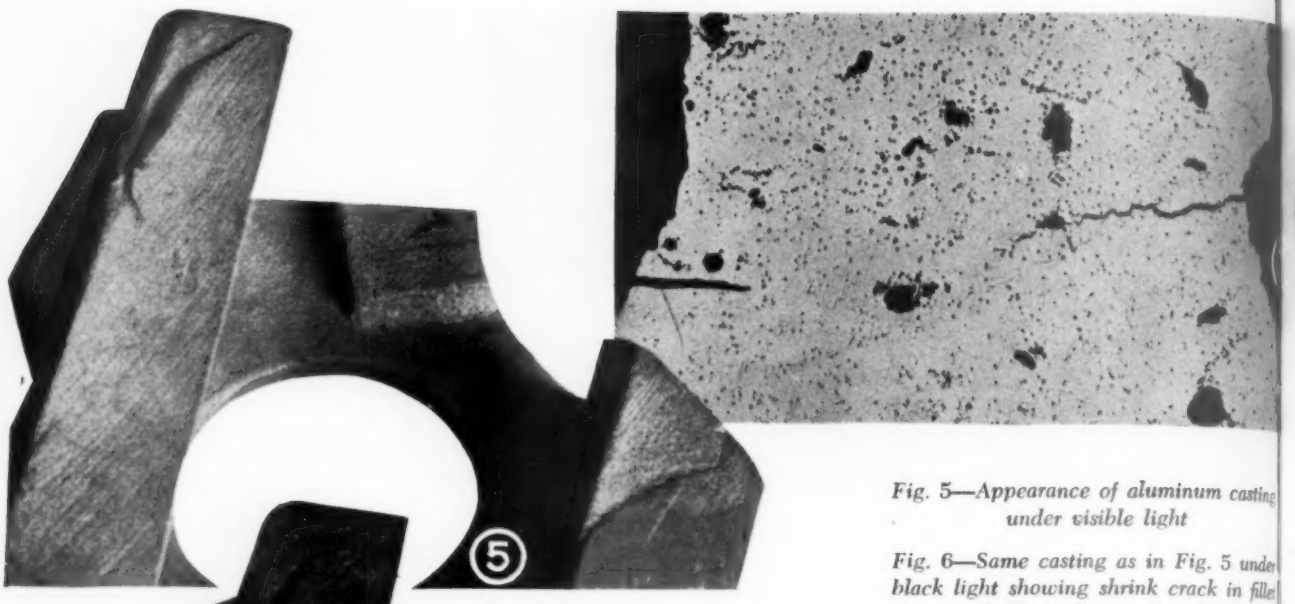


Fig. 5—Appearance of aluminum casting under visible light

Fig. 6—Same casting as in Fig. 5 under black light showing shrink crack in fillet between boss and web

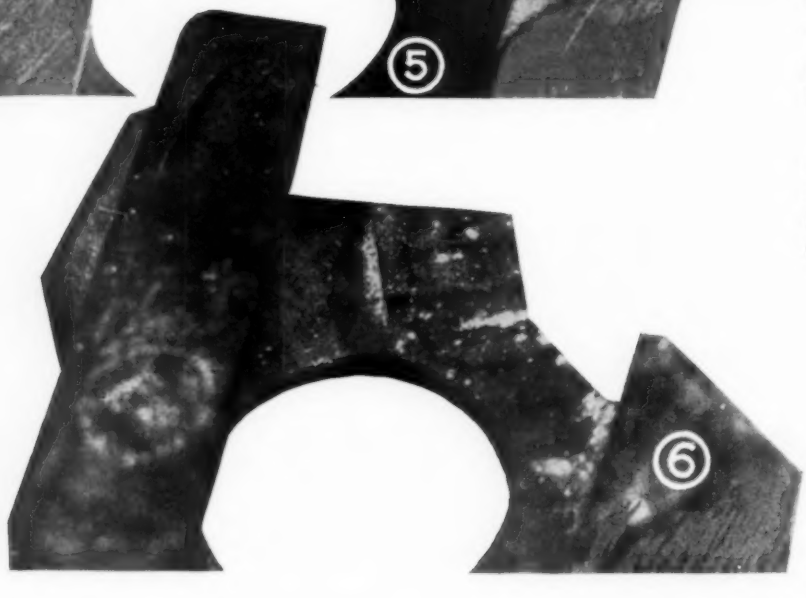


Fig. 7—Micrograph of cracks in casting shown in Fig. 6. Crack at right shows in view photographed under black light. Left-hand crack is in fillet on opposite side of casting

part should be allowed to set for about 5 minutes before examination so that the absorptive power or blotting action may function.

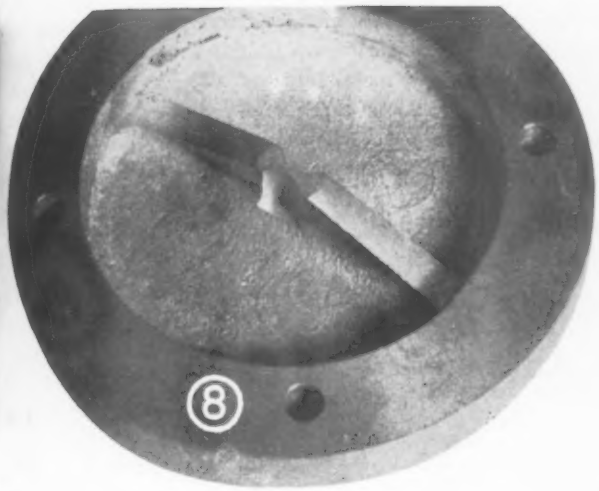
Only near-ultraviolet, or black light with little or no visible light, should be used as an activating agent. Possible sources include mercury vapor, argon glow, fluorescent and incandescent filament lamps. Mercury vapor lamps operated by alternating current are the most powerful activators available for fluorescence, and because of their line spectra, the energy is easily filtered to produce black light. Heat resisting glass filters are required with the lamps, which are available in sizes from 100 to 3000 watts. Each lamp requires an individual transformer which may limit use to more or less permanent mountings. The 100-watt units are quite satisfactory for small work and are sufficiently portable to permit inspection of small areas on large castings or assemblies. The 250-watt mercury vapor lamps give black light radiation of high intensity over an area included in an 18-inch diameter circle.

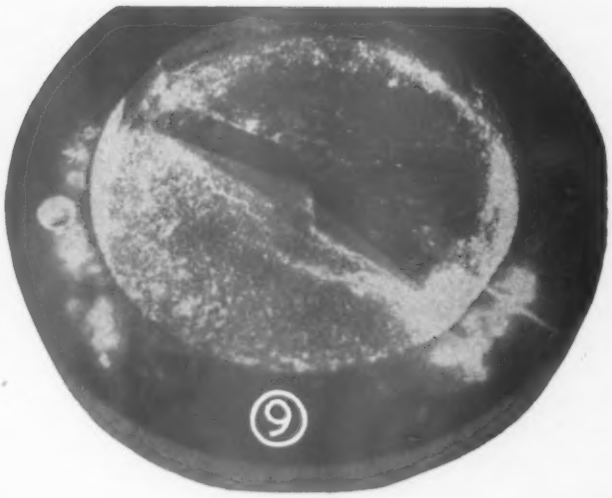
Fluorescent tubular lamps radiate an appreciable amount of black light and are efficient and effective activators. Tubular black light lamps are made especially for activation of fluorescent material. Operating at relatively low wattages per unit area, they generate very little heat and pot blue glass is suitable for filtering out the little visible light emanating from the lamps. Reflectors for fluorescent lamps should be aluminum, if possible, as the intensity of ultraviolet radiation is approximately twice as great as with a porcelain reflector. In laboratory and production tests a 48-inch fluorescent lamp unit with an aluminum reflector approximately parabolic in shape, fitted with two 40-watt black light lamps, and a single ⅛-inch thick pot blue glass filter proved quite satisfactory.

Commercially available argon glow lamps produce little visible light but radiate an appreciable amount of invisible energy in the black light region. Consequently, they may be used with or without filters depending upon the degree of black light desired, and as they have low operating characteristics on either alternating or direct current, they may be adapted to battery operation for portability in field operation.

Black light inspection is carried out best in a darkened room or a booth designed to eliminate direct shop lighting. With tubular black light lamps, little or no additional visible light should enter the booth while an appreciable amount is permissible with mercury vapor lamps of 250-watt output or higher. In general the amount of visible light should be limited to that required for handling of parts in the inspection booth.

Photographic records of fluorescence for permanent





filing, as indicated in some of the accompanying illustrations, can be made comparatively easily by use of high speed, color sensitive film such as Eastman Super XX, Agfa Pancro Press or similar, employing a Wratten G filter. Lighting consists of two 40-watt, black light fluorescent lamps from 12 to 18 inches from the subject to be photographed, and the exposure is 2 minutes. Development of film is that recommended by the film manufacturer for the particular type of film, and printing follows the regular procedure.

As mentioned earlier in the article castings may be handled in several ways for application of the fluorescent oil penetrant and subsequent washing. Fig. 4 shows a modern installation in a production aluminum alloy sand casting plant. Castings are placed on hooks suspended from a chain conveyor supported by an overhead tramrail system. At the extreme left of Fig. 4 the conveyor line dips down so that the castings are immersed in the fluorescent oil penetrant contained in a tank. The castings then are carried up and through the long tunnel at the left of Fig. 4 where excess penetrant is allowed to drain back to the tank.

Castings Are Washed Thoroughly

The two pipes or ducts near the exit end of the tunnel are for exhausting any oil or fume that might collect. The short, low covered section immediately adjoining the draining tunnel forms a baffle to prevent any water mist or spray from being carried back into the oil side of the system. The water mist is generated in the washing or rinsing chamber at the right of the short baffle section. Nozzles located in various positions in the washing chamber conduct high-pressure water sprays to all surfaces of the casting, removing all oil except that which has penetrated beneath the surface through discontinuities. After washing the castings proceed to the adjoining cabinet where they are dried by heated airblast. The castings continue on the conveyor hooks doubling back behind the equipment just described to the inspection booths where they are examined under blacklight lamp equipment.

Fig. 8—Permanent mold casting photographed in visible light. Fig. 9—Same casting as in Fig. 8 under black light showing fine shrinkage cracks and shrinkage porosity

Fig. 10—Section of aluminum sand casting as it looks under visible light. Fig. 11—Under black light the casting shown in Fig. 10 reveals a fine crack in the fillet next to the boss

Editor's Note: The method of detecting flaws with black light and a fluorescent substance, as discussed in this article, is covered by U. S. Patent No. 2259400 and is licensed under the trade name Zyglo by the Magnaflux Corp., Chicago. A fluorescent oil solution of the type described is sold under the trade name Zyglo Penetrant.

CENTRIFUGAL Casting Speeds

By DR. J. E. HURST
Sheepbridge Stokes Centrifugal Castings Co. Ltd.
Chesterfield, England

This second and concluding installment taken from a paper presented at the annual meeting of the Institute of British Foundrymen gives information on centrifugal casting speeds employed in commercial practice

SPEEDS of rotation used in various commercial processes have for the most part been derived by experiment. Such principles or rules that have been adopted have been fixed for the most part arbitrarily and their suitability confirmed by experiment. It is convenient to consider these under the separate headings of (1) true centrifugal castings, vertical axis and horizontal axis; (2) semi-centrifugal; and (3) pressure castings.

Spinning about the vertical axis is usually adopted for the production of castings of large radial thicknesses in comparison with the length, and in those cases where the length is small in comparison with the diameter. The Billand process,[13] proposed in Germany for the production of cast iron pipe by spinning about the vertical axis by virtue of the special pouring arrangement adopted, may more properly be considered as a special case of the Lavaud-Briede type of casting process.

In the Wasson process for the production of individually cast piston rings using built-up and sand molds spinning was operated at speeds calculated to give a constant centrifugal pressure of 100 pounds per square inch. The principle of arranging the rotational speeds to provide for a minimum centrifugal pressure in accordance with the diameter and radial wall thickness of the castings was adopted in the process designed by the firm of David Brown. In the description of this process given by Rowe,[14] the speeds were arranged to give a minimum pressure of 45 pounds per square inch and over the range of castings this was provided for by speeds of 450 to 950 revolutions per minute. Another application of vertical spinning processes to the production of bronze gear wheel blanks is described by Stockton.[15] A speed of at least 700 revolutions per minute is recommended for castings having an outside diameter of 12 inches. This is equivalent to a peripheral speed of 2100 feet per minute. A constant peripheral speed of at least this order is recommended, it being stated that speeds in excess of this are in use.

An adaptation of the vertical centrifugal casting process to the production of bi-metal chilled rolls described by Hundt and Weber[16] allowed of the introduction of the first type of molten metal into the rotating chill mold rotating at a sufficiently high speed. Following upon the introduction of the second metal into the hollow core, the rotational speed was reduced to a value low enough to retain the body of the roll solid and a parabaloid depression in the head only. In the case of a roll 600 millimeters diameter and a body length of 1000 millimeters, an initial speed of 800 revolutions per minute was necessary. Upon pouring the core, the speed was reduced and brought to a final speed of 200 revolutions per minute.

An inclined axis of rotation is adopted in a machine described by Zaiser.[17] This machine is constructed to be capable of rotating at speeds of from 50 to 3000 revolutions per minute, and as it is intended to operate with a variety of nonferrous alloys, precise rotation speeds are not given, it being recommended that these be determined by experiment.

The taper in the vertical bore of castings produced in this manner can be used to determine the rotational speed. By establishing the permissible taper it is possible in any given casting to calculate the speed of rotation from the relationships given in equation (1) and (2) above. Experience agrees that such calculated speeds are in general not sufficiently high. The type of metal poured, its viscosity, pouring temperature, the temperature and character of the mold and its surface are some of the factors which operate and cause a deviation from the theoretical relationship.

In general the actual taper is somewhat greater than that calculated. Operating with bronzes, Zuehlke[18] states that speeds must be increased to a point where centrifugal force is about 100 times that of gravity and on this basis derives the relationship

$$N = \frac{2655}{\sqrt{D}}$$

(*Please turn to Page* 218)

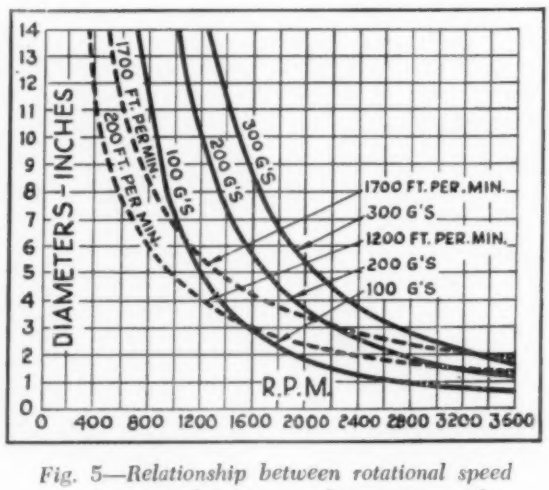


Fig. 5—Relationship between rotational speed and casting diameters in thin section work

CHINA NEEDS RAW MATERIALS

By E. K. SMITH

Specialist in Metallurgy
Far Eastern Branch
Division of Cultural Co-operation
U. S. Department of State, China

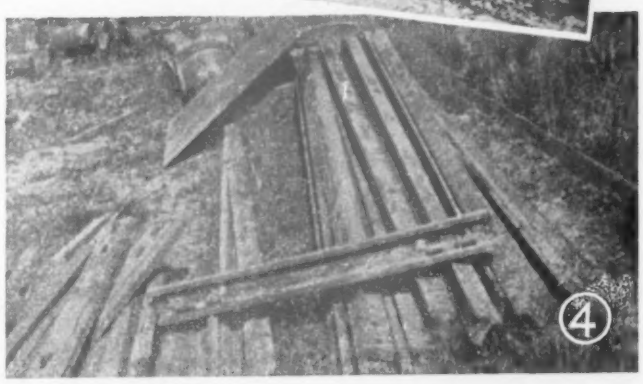


Fig. 1—The author, now serving in China for the U. S. Department of State. Fig. 2—Molding foreman and assistants, with experimental steel munition castings, at one of the best foundries. Fig. 3—Shattered column on which is described the heavy bombing of a foundry. Fig. 4—How the Chinese improvise. These heavy rails for emergency use were made of cast iron, no rolling mill equipment having been available

I HAVE just completed four months in China under the Cultural Co-operation Program, U. S. Department of State, and find the work and the Chinese foundries most interesting. The work, as well as one's personal life, is a sort of continuous adventure. I spend anywhere from a few days to a month at each plant, working on iron and steel castings, and on some malleable experimental runs.

Shortage of raw materials is a big problem, especially when trying to meet specifications for important war castings. For instance, it is necessary to make sound, high strength, gray iron castings when the coke varies from 15 per cent to 35 per cent ash. Most of the pig available is made in little native blast furnaces about 3-ton capacity, and the fracture of the pigs runs from gray to white, accompanied with blow holes. No steel or cast scrap is available. There is no way to get carbon analysis, as most of the combustion tubes are gone. (Where I am at present, there is a combustion tube, but the heating element was removed by a fragment of bombshrapnel). This is where *chill* tests are invaluable; they tell one almost everything about the iron.

A good deal of the steel for castings is made in bessemer converters. In some districts, the problem is complicated by the available pig iron having from 0.30 per cent phosphorus, up. We have been working on dephosphorizing in the cupola, and results are promising.

Cupola melting practices, converter blowing, and pig iron made in the regular blast furnaces are all excellent. In order to get into large production, when the roads are open, it will be necessary to bring in much equipment, such as molding machines, compressors, sand handling equipment, etc.

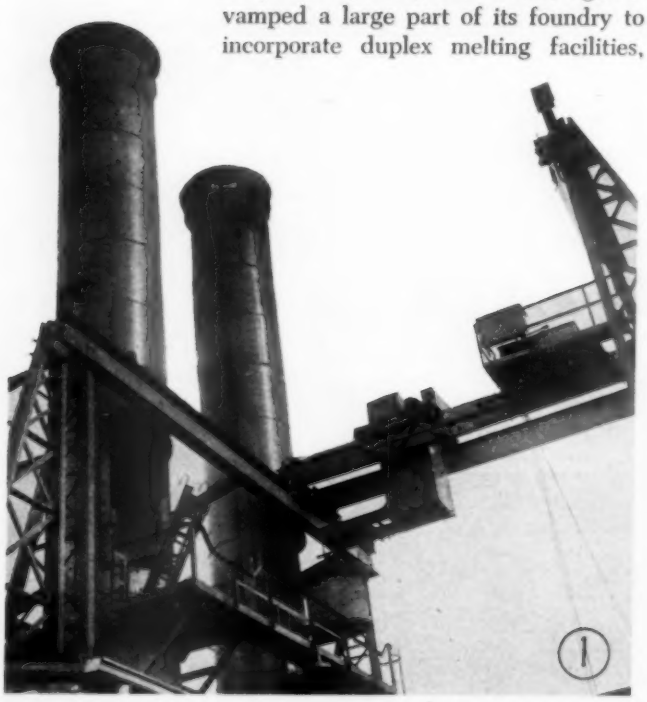
A lot of smaller equipment is badly needed. We are so accustomed at home to having necessary technical information immediately available, that it is a real problem to make quality castings with little or no analyses, little sand control apparatus, and few testing machines, even brinell or rockwell.

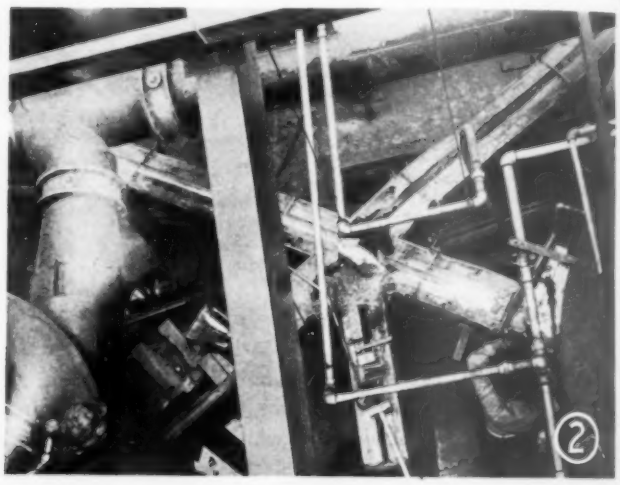
I use the *chill* test for cast (*Please turn to page* 232)

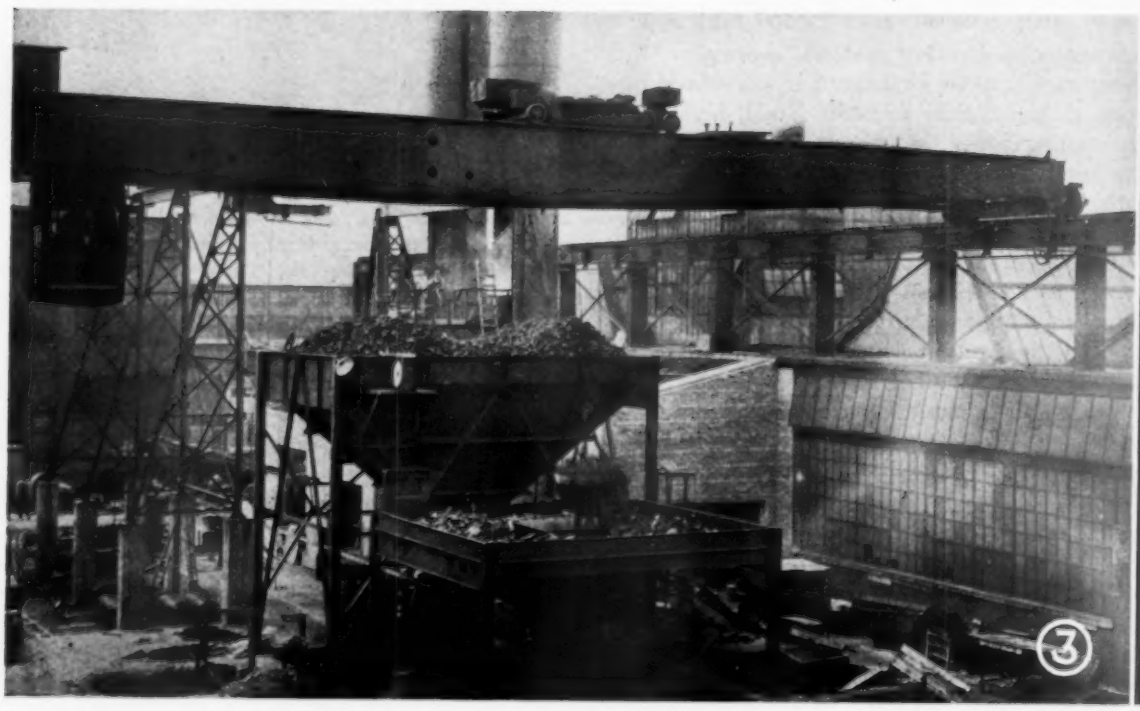
Plant Modernization INCREASES MALLEABLE PR

FACED with sharply increased war demands for malleable iron castings, the Belle City Malleable Iron Co., Racine, Wis., a short time ago revamped a large part of its foundry to incorporate duplex melting facilities, mold conveyors and mechanical sand handling equipment. The new installation has resulted in substantially higher output in the same main floor area, and is an interesting example of modern developments in mechanized foundry layout and equipment. It likewise demonstrates the marked increase in production that is obtainable in certain malleable plants through use of mechanical handling and its necessary adjunct, continuous melting.

The Belle City foundry formerly employed batch melting with three air furnaces. New melting equipment con-







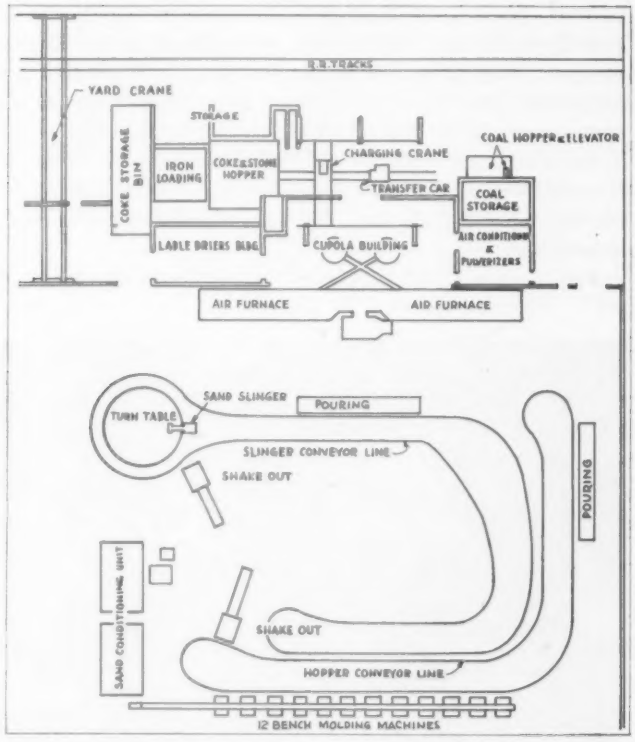
By WILLIAM G. GUDE

Associate Editor
THE FOUNDRY

L PRODUCTION

sists of two cupolas and two air furnaces. As indicated by the accompanying sketch showing the general layout of the modernized section, the cupola building and facilities for storage and handling of raw materials extend from the main foundry structure. Raw materials are received over the railroad spur adjacent to the yard and, preparatory to charging, are handled by an overhead crane the runway of which embraces this spur.

Weigh hoppers are provided for measuring the correct amounts of metallic material, coke and limestone to be charged. A general view of the yard and hoppers is shown in Fig. 3. Pig iron, steel scrap and sprue are loaded into their loading platform by the yard crane and then are dropped into a charging bucket carried by an electrically operated transfer car, when the latter is positioned underneath. The car operator manipulates a lever which releases the metal charge into the bucket. A typical 3000-pound metal charge consists of about 45 per cent sprue, 35 per cent steel scrap and the balance pig iron, with



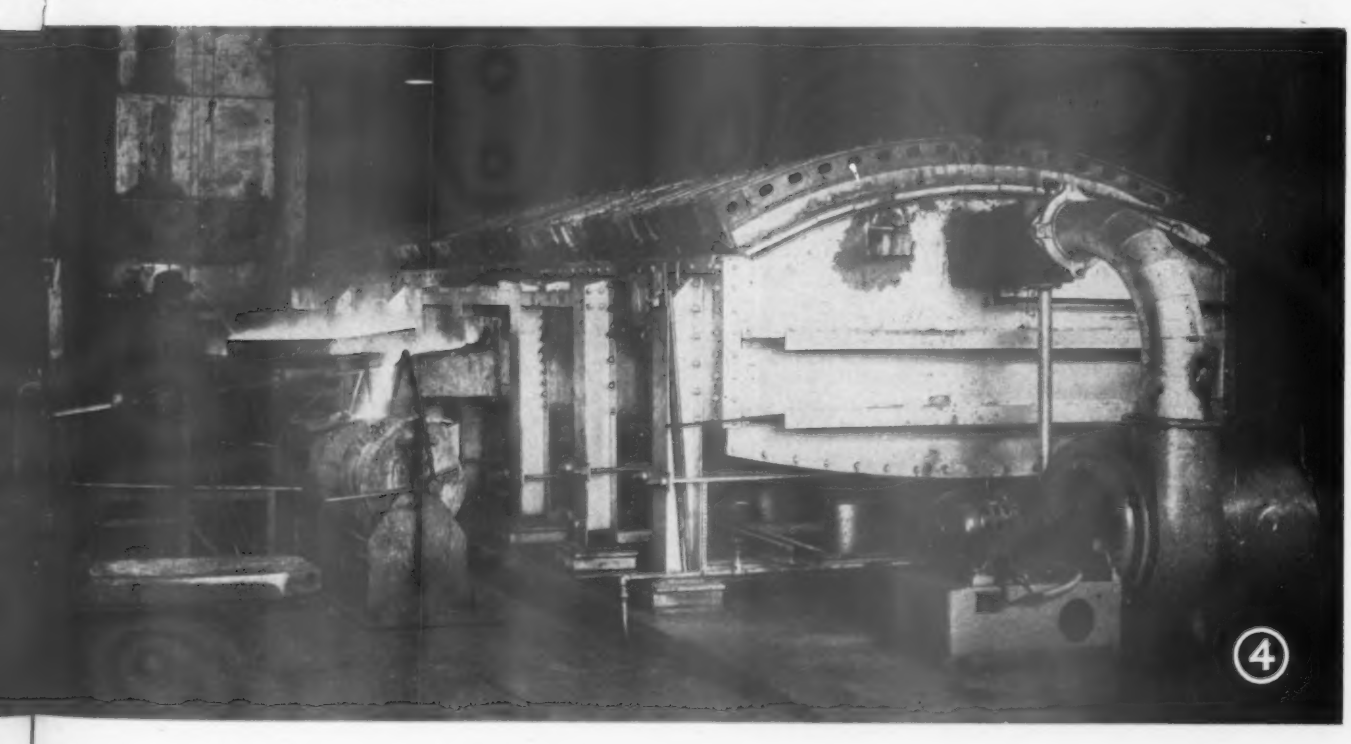
Sketch showing general layout of modernized section of Belle City Malleable Iron Co. plant, Racine, Wis.

Fig. 1—Mechanical equipment for charging cupolas. Fig 2—Overhead view showing arrangement of spouts from cupolas to air furnaces. Fig. 3—Raw material yard. Weigh hoppers measure correct amounts of various materials charged in cupolas. Fig. 4—Metal is tapped from 35-ton air furnaces into bull ladles automatically positioned under spout by transfer car. Lift truck carries ladles to pouring stations

silvery comprising somewhat less than one-half of the pig iron.

The transfer car then is moved to the adjoining hopper to receive its load of approximately 400 pounds of coke and stone, after which it travels to the cupola charging crane. Fig. 1 shows the charge bucket after it has been elevated and is about to pass through the cupola charging door and be automatically dumped.

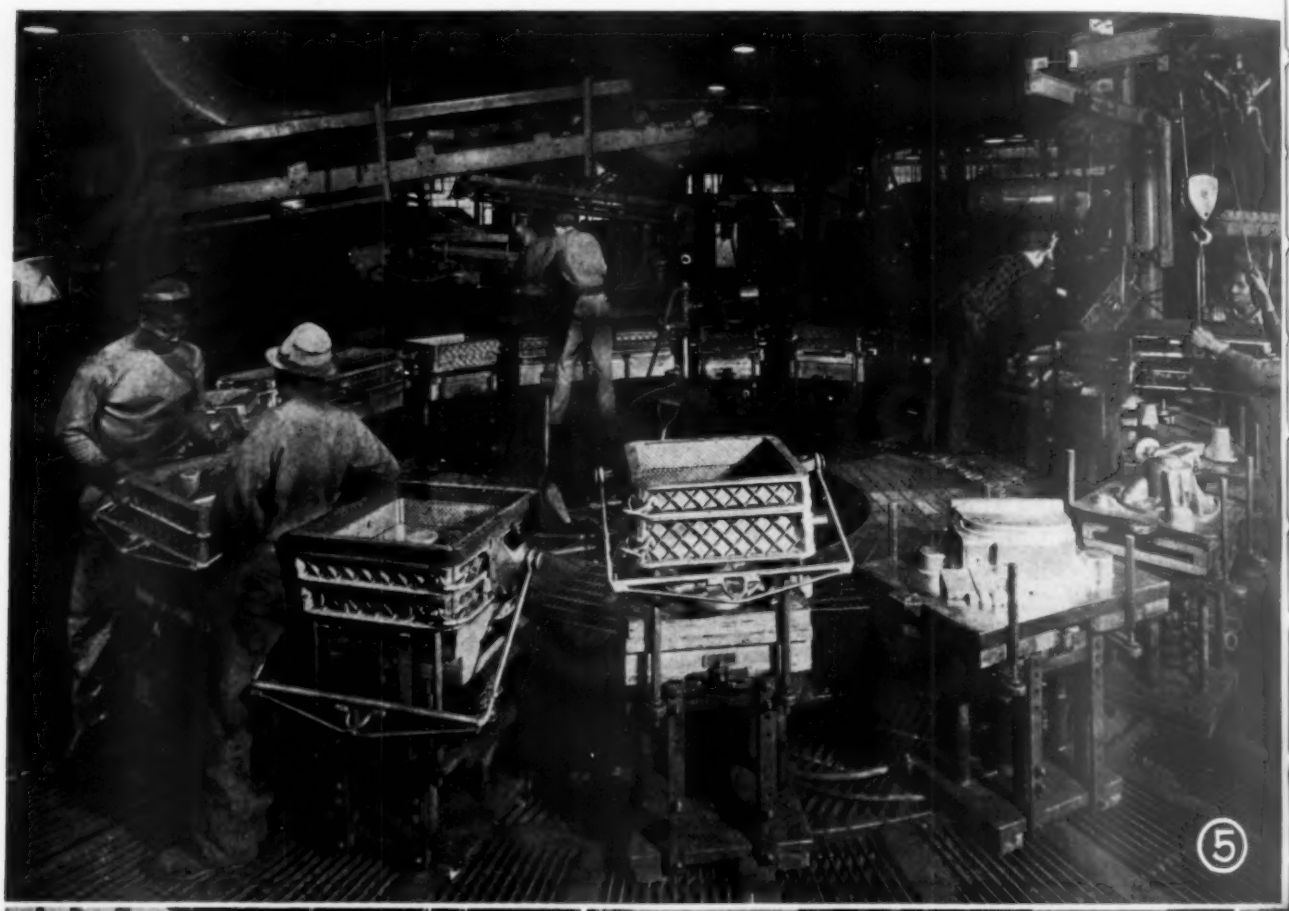
The two cupolas, each lined to 60-inch inside diameter and melting 10 tons or more per hour, are used alternately, one being operated 20 hours while the other is being re-

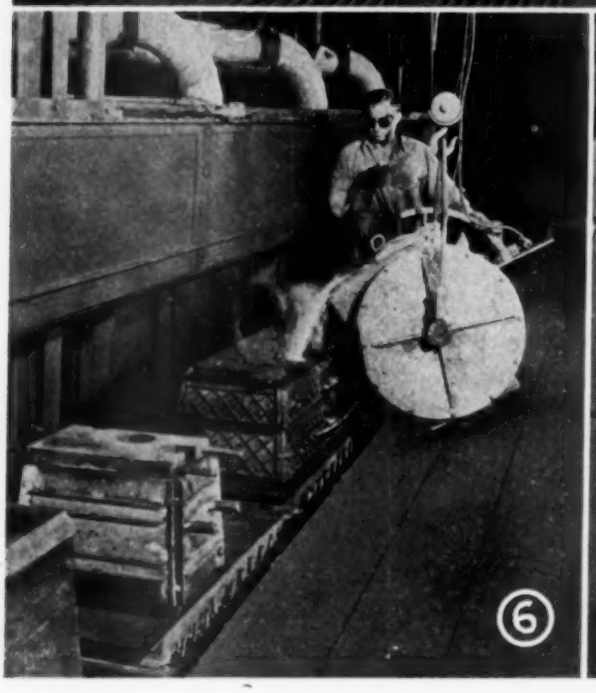


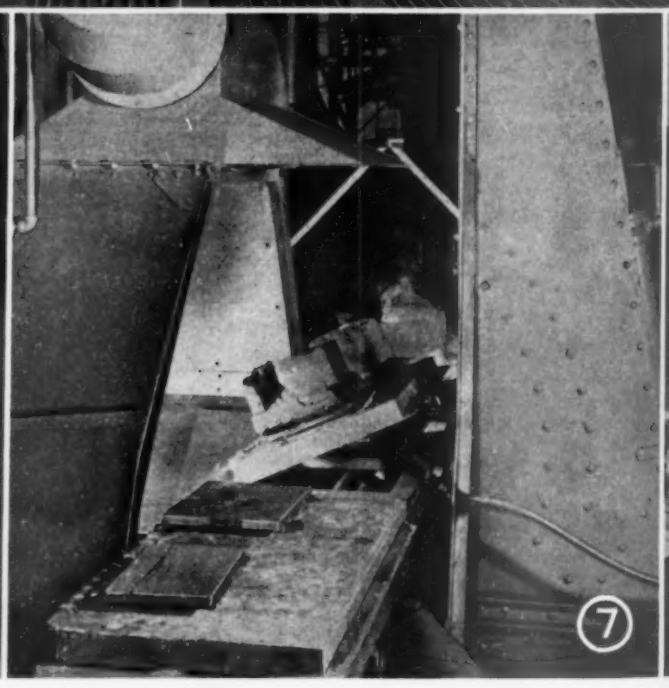
paired. Long front-slagging spouts from the cupolas lead directly to the air furnaces and are arranged scissor-like to intersect each other, as shown in Fig. 2. With this arrangement and the use of dams it is possible to tap metal from either cupola into either of the two air furnaces. Slag is quenched in a water pit in front of the cupolas. The air furnaces also are operated alternately, each one being in service for about six days before a shutdown for repairs is necessary.

Air is conditioned before it is blown into the cupolas, the blowers being connected to a unit of the lithium chloride type which removes excessive moisture from the air passing through it. This unit is housed in a room adjacent to the cupola building, the same room also containing the pulverizers which provide powdered coal to the air furnaces. There are two pulverizers but only one is used at a time, the other being for standby purposes.

Coal is fed to the pulverizers from 20-ton capacity overhead hoppers, while the latter are filled by a bucket elevator leading from a storage bin directly to the rear.


⑤


⑥


⑦

Hot metal is tapped from the cupola at about 2800 degrees Fahr., and its temperature is raised approximately 150 degrees during its 2-hour passage through the air furnace. In that period, during which time analysis checks are made every 30 minutes, the total carbon content of the metal is reduced about 50 points to a final analysis of close to 2.30 per cent. Composition of the cupola metal is such that special provision for desulphurization is not required. Type of malleable iron produced is Grade 35018-A.

As shown by the sketch, the two air furnaces are in line with each other, and waste heat passes to a boiler located between them. Each furnace has a capacity of 35 tons. Instead of being built flush with the floor the furnaces are elevated about 5 feet on pedestals, this permitting air circulation under the bottoms. Metal is tapped from the side facing the molding lines into 1000-pound capacity cylindrical bull ladles mounted on a small air-operated transfer car, as shown in Fig. 4. This car automatically positions a ladle under the spout. When the ladle is full it is picked up by a lift truck and carried to one of the pouring stations; meanwhile the second ladle is being filled, and before it is ready to be removed an empty ladle is returned and placed on the car. With proper synchronizing of mold pouring and hot metal transfer the only interruption to continuous tapping is the brief time required to shift ladles under the spout.

Molding stations, conveyor lines, shakeouts and sand conditioning units occupy a floor area approximately 130 x 180 feet. The fact that in an adjoining space of the foundry some machine molding of short-run or odd size castings still is carried on without benefit of mechanical handling of molds and sand, offers a marked contrast between the old and the new practices.

Under the new arrangement two continuous mold conveyors are provided, one, 430 feet long, to accommodate molds for the smaller castings made at a 12-station line of squeezer machines, and the other, 578 feet long, to serve a stationary sandslinger which rams molds for the larger castings. The latter, or so-called slinger line, is particularly interesting in the arrangement of molding facilities. These are incorporated on a turntable located within the loop at one end of the conveyor line, and shown in Fig. 5.

The turntable, slightly under 24 feet in diameter, has provisions for the molding of eight different castings, and revolves continuously at a peripheral speed adapted to the travel of the conveyor. Sixteen stations, one for each cope and drag of the eight castings, are spaced circumferentially a few feet from the edge of the table. Each station consists of a machine on which a cope or drag pattern is mounted and over which a flask (*Please turn to Page* 230)

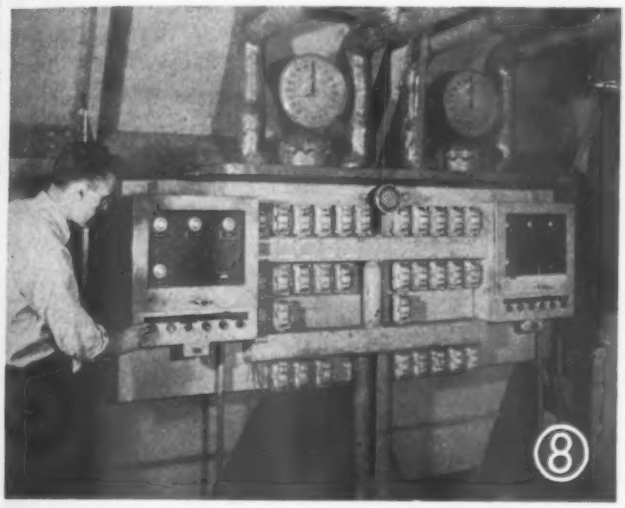


Fig. 5—Ramming molds by sandslinger as flasks revolve continuously on turntable. Fig. 6—Mold conveyor line is partially hooded at pouring platform, completely hooded beyond. Ladle is moved mechanically at same speed as conveyor during pouring. Fig. 7—Poured molds being automatically dumped at shakeout station. Fig. 8—Control panel for two 3000-pound capacity sand mixers. Fig. 9—Apron conveyor returning castings from shakeout to main floor. Fig. 10—General view of second molding line and conveyor. Each of 12 molding stations receives sand from individual overhead hoppers

Injuries and Accident Causes IN THE FOUNDRY INDUSTRY

Kinds of injuries experienced by workers in various departments of the foundry are detailed and means of preventing them are recommended in this third installment of a general analysis of safety problems

By Frank S. McELROY
and
GEORGE R. McCORMACK

Industrial Hazards Division
Bureau of Labor Statistics
United States Department of Labor

USE of personal protective equipment generally does not prevent *accidents*. However, it seems apparent from the character of the injuries experienced by foundry workers that more extensive use of protective equipment could do much to prevent or minimize a great many foundry *injuries*. Conservatively, it is estimated that 40 per cent of all foundry injuries could be avoided through the general use of proper goggles, gloves, leggings, spats, and safety shoes by workers engaged in operations which present eye, hand, foot, and leg hazards.

More than 26 per cent of all the disabling injuries analyzed in this survey were foot and toe cases. Over nine-tenths of the toe injuries and more than three-fifths of the foot injuries were cuts, bruises, or fractures resulting primarily from heavy objects being dropped or set down improperly. Most of these injuries probably would have been avoided if the workers had been wearing safety shoes or metal foot guards. Burns, primarily caused by hot metal spilled in pouring, were the source of about a third of the foot injuries. Most of these injuries might well have been prevented through the general use of proper spats and molder's type shoes.

Hand and finger injuries accounted for 23 per cent of the entire volume of disabilities. The majority of these were cuts, sprains, and bruises, although 1 in every 5 hand injuries was a burn, and a similar proportion of the finger injuries were fractures. Protective equipment which will prevent crushing injuries to hands and fingers is generally considered impracticable. Nevertheless, the simple provision and use of gloves when handling hot, rough, or sharp-edged materials would probably have avoided most of the hand and finger burns and a large proportion of the cuts and lacerations.

Eye injuries totaled about 10 per cent of all the disabilities. The majority of these were cuts or lacerations caused by flying particles, although 1 in every 6 was a burn. The universal use of safety goggles by all workers exposed to flying particles undoubtedly would have avoided practically all of the eye injuries.

Back injuries accounted for nearly 12 per cent of the disabilities. Practically all of these were strains, or sprains resulting from lifting excessive weights or lifting improperly. It should be noted, however, that in a number of instances back disabilities, which became evident when the workers attempted to lift materials, were suspected to have resulted from sudden chilling after exposure to great heat, rather than to lifting.

Injuries to other parts of the trunk constituted about 10 per cent of the total number of disabilities. A large proportion of these were strains and sprains arising from lifting or overexertion. One in every 8 of the injuries in this group were hernia cases.

Injuries to the head, other than eye cases, and injuries to arms were relatively infrequent. Leg injuries, however, totaled nearly 9 per cent of all the cases analyzed. Three-fourths of the leg injuries were cuts, sprains, and bruises arising primarily from forcible contact with mishandled materials.

In general, the injuries in each of the three types of foundries visited fell into much the same pattern, although there were a few significant differences among the three groups.

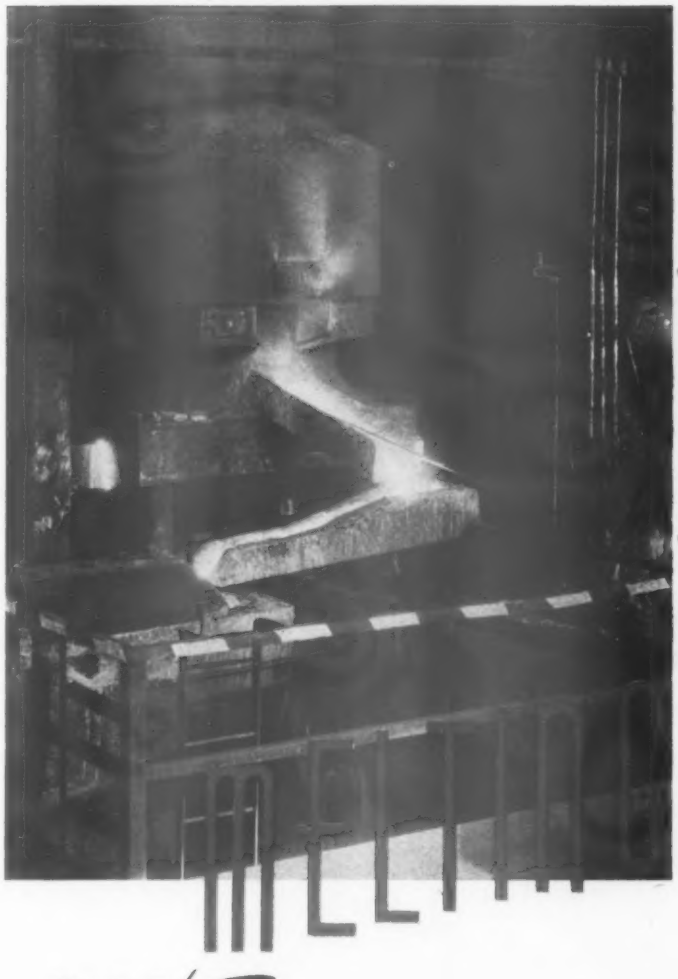
Foot injuries were outstanding in all three groups, but relatively were considerably more important in the gray iron plants than in either the malleable iron or steel foundries. On the other hand, back and trunk injuries were of greater importance and eye injuries were of much less importance in the malleable iron foundries than in either of the other groups. In the steel foundry group toe, leg, hand, finger, and head injuries were proportionately more important and back and trunk injuries proportionately less important than in either the gray iron or malleable iron foundries.

In all three types of foundries the most important injury categories were strains, sprains, or bruises and cuts or lacerations. Burns were third among the injury categories followed by fractures in the gray iron and malleable iron foundries. In the steel foundries, however, there were more fractures than burns.

Since the type of injury incurred varies with the work performed, the occupational experience of the different classes of employes also was analyzed.

Chainmen.—Material falling from crane loads, and loads lowered upon the workers were the primary sources of injuries to chainmen. There were, however, numerous cases of crushed fingers result- (*Please turn to page* 248)

By JOHN HOWE HALL



80% Ferromanganese in Cupolas

DURING the last few years, there have been numerous references in the technical press to experiments with basic-lined cupolas. Especially in England* this subject is receiving a great deal of attention, and the possibilities of desulphurizing and dephosphorizing the metal melted in these cupolas are most interesting and promising.

As a side issue, the use of basic linings in small cupolas used to melt 80% ferromanganese for making austenitic manganese steel by combining low carbon steel from converters and melted ferromanganese, is being tried out. The basic linings are being installed in an effort to solve the problem of severe wear on linings that is encountered because of the high percentage of MnO in the oxidation products resulting from the melting of ferromanganese in an oxidizing atmosphere. Cupolas lined with dolomite or magnesite are said to give a lining life of "several days" in this service, and apparently this is considered to be quite encouraging.

The fact is that for many years, starting in 1916, 80 per cent ferromanganese was melted in cupolas in this country, with absolutely no trouble in maintaining an ordinary clay brick lining. With an average run of 7 hours per day, 6 days per week, melting somewhat over 20,000 pounds of ferromanganese per day, the linings required renewal only after 8 to 10 months' service. The practice followed was somewhat briefly described in Hall's *The Steel Foundry*, second (1922) edition, page 125, but the reference seems to have escaped the notice of the present generation of metallurgists. The author offers the following description of his development of the process thirty years ago, in the hope of being of some assistance to his brothers in the craft.

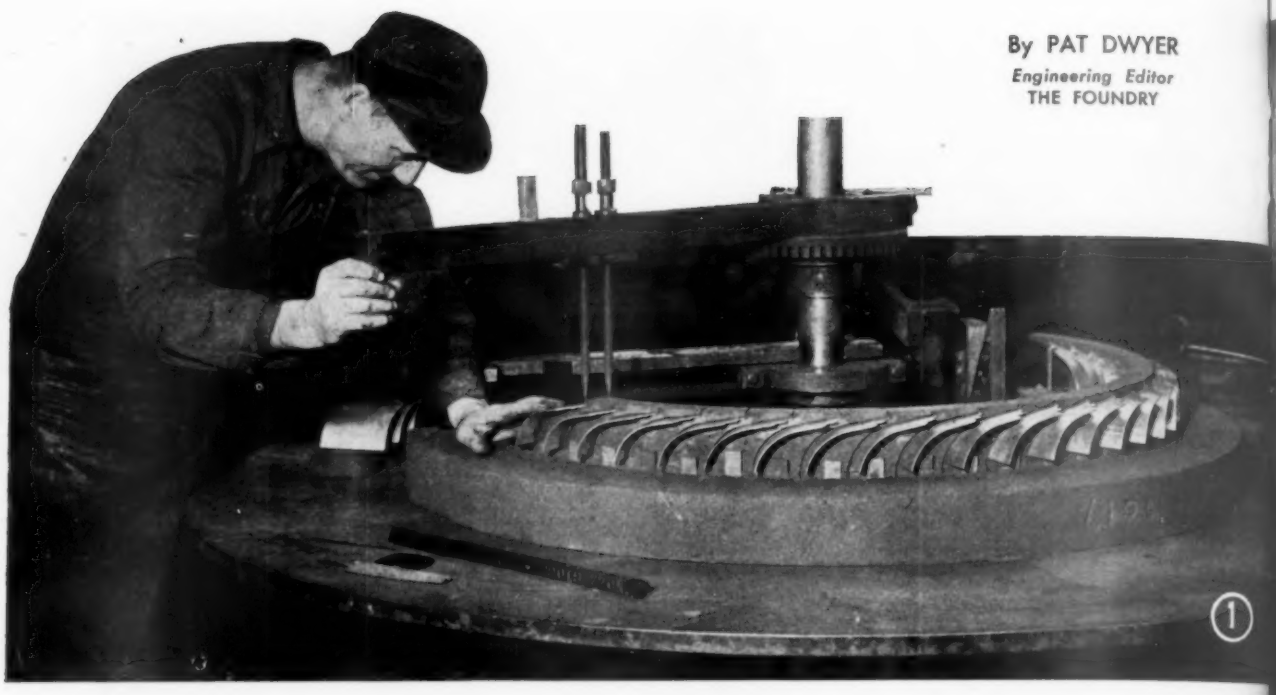
Some years before World War I, the late Sir Robert Hadfield drew the attention of the company with which the author was then connected, to his method of melting 80 per cent ferromanganese in small movable cupolas. Sir Robert used baby cupolas mounted on cars, each large enough to hold about 1000 to 1500 pounds of melted metal. When the cupola was started up, the bed coke was first well lighted, then the ferromanganese was loaded into a sheet iron cylinder and set on the bed in the middle of the cupola. Coke was placed in the annular space between this container and the lining of the cupola, and more coke was spread over the top. The cupola thus prepared was wheeled into position under a hood or stack, and connected to a blast line by flexible hose. The blast was turned on, the metal melted and tapped, and the cupola on its car was wheeled back into the space reserved for handling the several bodies and cars required. The cupola was turned upside down and dumped, a new bed charged and fired up, and another charge of metal loaded in the same manner.

As the author's employers required 1200 pounds of melted ferromanganese every 20 minutes for from 6 to 10 hours (our record day's run was 30 converter blows of manganese steel, of 3 tons each), the routine outlined by Sir Robert was far too cumbrous and slow, and we set to work to simplify it. Up to that time we had been forced to use crucibles to melt our ferromanganese, which had always been a costly method, and after World War I had been going on a couple of years, the price of crucibles had skyrocketed and service from them had hit a new low.

As described in *The Steel Foundry*, a small cupola, lined to 30-inch diameter, was available. It had four tuyeres, each about 4 x 8 inches in cross section at the lining, and set at such a level as to allow 1100 to 1300 pounds of melted ferromanganese to accumulate in the bed. The height from tuyeres to charging (*Please turn to Page* 195)

*Report of the Melting Furnaces subcommittee of the Technical committee, Institute of British Foundrymen, reprinted from *Foundry Trade Journal* in *American Foundryman* for February, 1945, p. 4, especially p. 7.

By PAT DWYER
Engineering Editor
THE FOUNDRY



GRAY IRON CASTINGS
for Power Plant Equipment

STARTING off with a population of one man and family, the town of Jeannette, Pa., located in one of the almost innumerable narrow valleys in the great industrial Pittsburgh area, gradually has developed into a city of 18,000 and is recognized—among other reasons—as one of the principal glass manufacturing centers in this country. The original settler—and eventually by thrift and diligence and one thing and another, the first citizen—in addition to many other commendable attributes, showed a nice sense of modesty, gallantry and family affection, when instead of yielding to vanity and following the usual fashion of the early settler in calling the town after himself, called it after his wife, Jeannette.

Considerably more than several years after the events described in the preceding chapter, a young and up coming inventive industrial genius, W. S. Elliott,—no kin of the first settler—decided this was a suitable spot to establish a plant for the manufacture of a line of steam power plant specialties.

He had started on his industrial career in a little one-room building in Pittsburgh in 1901. The original product was boiler tube cleaners, which incidentally still are made in the Springfield, O., and Newark, N. J., plants of the company. After several expansions in Pittsburgh a plant was purchased in Jeannette in 1913. One of the first additions to this plant was a foundry. The business expanded rapidly and many other buildings were erected in the 1920's. In 1923 the company purchased the Kerr Turbine Co., Wellsville, N. Y., and moved the turbine work to Jeannette. The Ridgway Dynamo & Engine Co., Ridgway, Pa., was purchased in 1926 and has been continued in operation as the Ridgway plant of the company.

The venture proved even more successful than he had anticipated. For more than 30 years the products of the Elliott Co., Jeannette, Pa., have been rolling out of the town 26 miles southeast of Pittsburgh on the main line of the Pennsylvania railroad. The company does not make ships nor shoes nor sealing wax, but makes power plant and process equipment in wide variety, prime movers and marine propulsion units used in these and many other industries, not only in the United States, but in foreign countries. The marine and shore engineer at home and abroad, whether he can or cannot read the English language, is as familiar with the name plate *Elliott Company, Jeannette, Pa.*, as he is with the proudly framed "Ticket" hanging in engine room or cabin, announcing to one and all that a duly constituted board of examiners is satisfied that John Doe has successfully passed all the tests and in the well con-

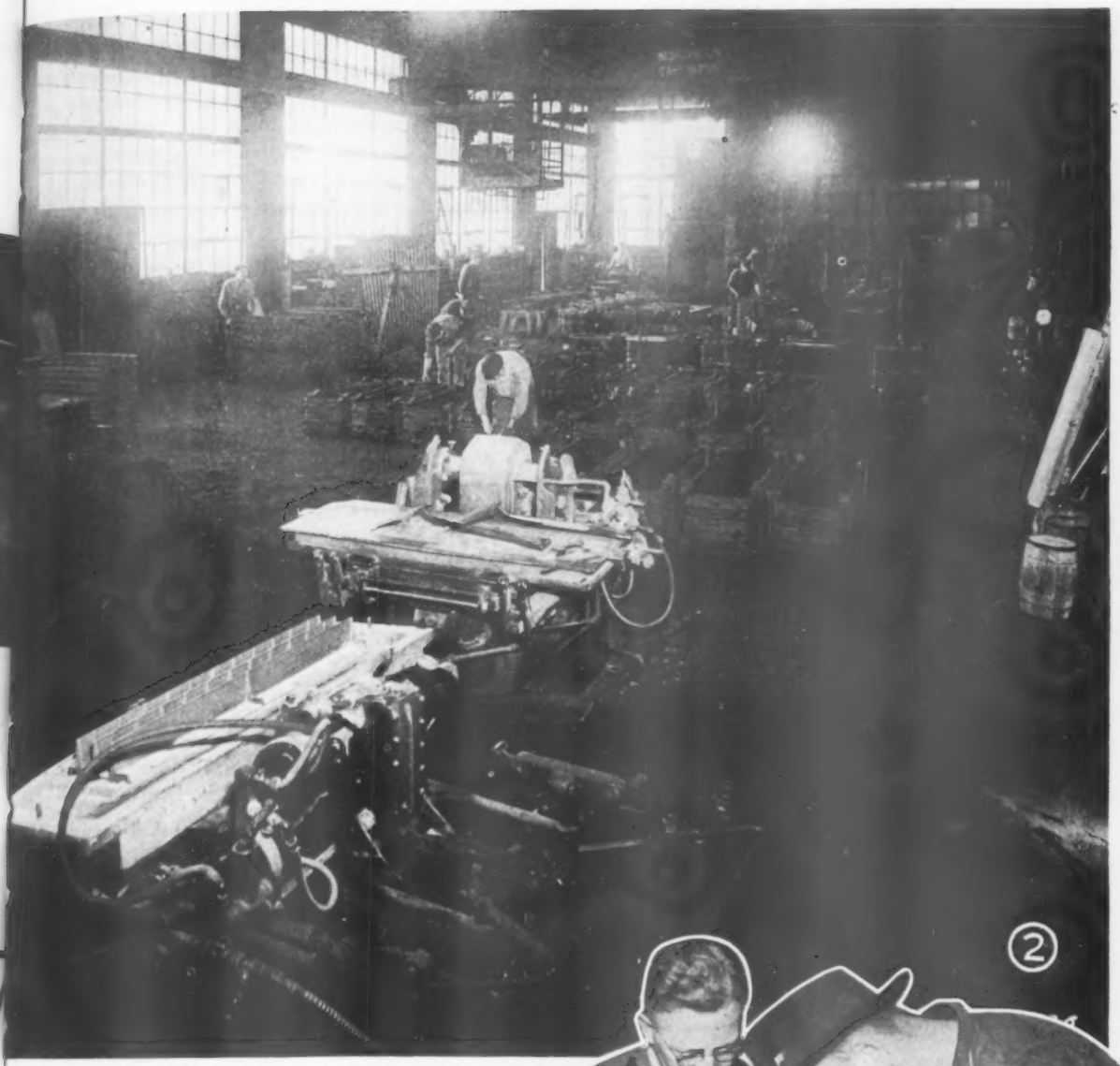
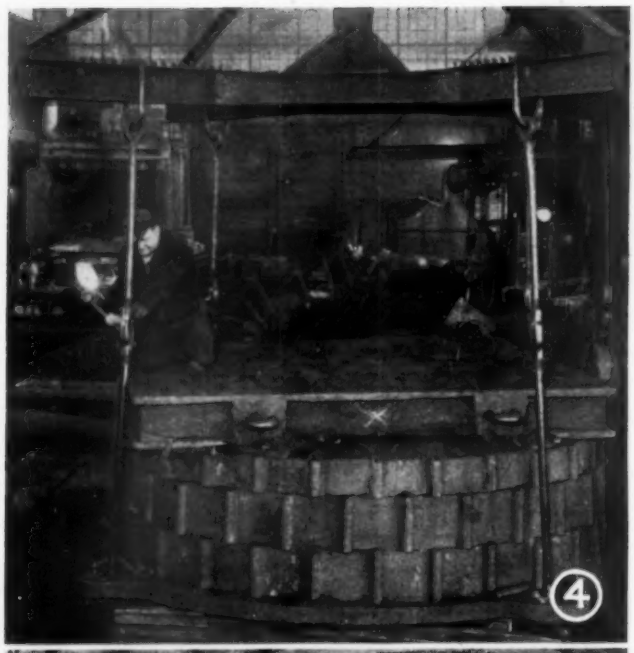


Fig. 1—Stainless steel blades are set into the core with the greatest accuracy. Fig. 2—Light and medium weight castings are made in one of the side bays of the foundry. Fig. 3—Cores and steel blades assembled on surface table

sidered opinion of those who sit in high places is competent to operate a power plant.

Products of the company include electrical equipment, heat transfer apparatus, industrial process equipment, power plant accessories, centrifugal blowers and compressors, superchargers for diesel engines and tube cleaners. In addition to the main plant and offices in Jeannette, the company operates branch plants in Ridgway, Pa., Springfield, O., and Newark, N. J. Volume of work handled is indicated by the sales volume for 1944 amounting to $27,000,000.

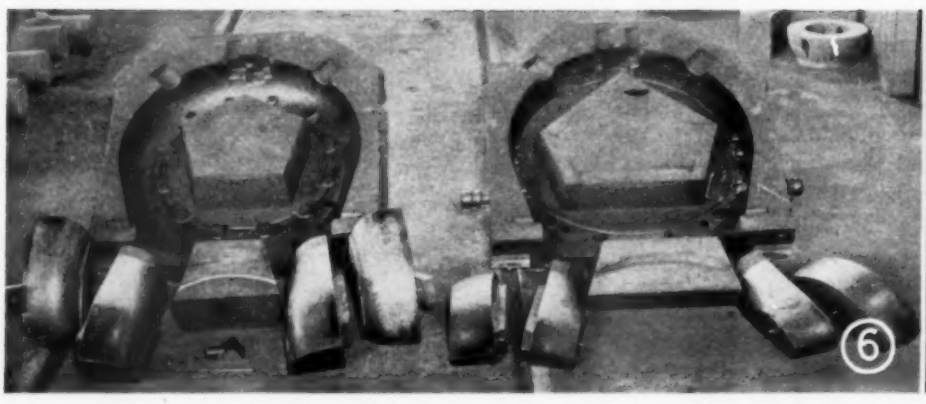
The extensive group of brick buildings comprising the plant on the northern outskirts of the city includes a main machine shop 1000 feet in length and a gray iron foundry 140 x



240 feet. A well equipped nonferrous foundry also is operated in an extension to the main foundry building. The present description is confined to the gray iron foundry where castings conforming to exacting specifications are made for regular company products, and to some slight extent for outside interests. Individual castings range in weight from a few pounds up to approximately 20 tons. The heaviest casting in the history of the plant, made several years ago, weighed 25 tons.

Metal is melted in two cupolas, one lined to 54 inches inside diameter and the other lined to 42 inches. At one time loam molding was practiced extensively, but with improvement in sand technique, flasks and rigging, gradually was discontinued. All large castings now are made in molds skin dried by natural gas flame. For light work the flame from a torch is played over the surface to create a dried layer of sand from ¼ to ½-inch deep. On large jobs, the gas jets from a perforated pipe assembly laid on suitable supports in the bottom of the mold, dry the sand face to a depth of 3 or 4 inches. Usually the cope is placed above the drag with suitable space blocks between. With this arrangement cope and drag are dried at the same time.

The foundry building is divided into three longitudinal main bays by two rows of steel columns on 20-foot centers which support the roof and also support the runway in the central or main bay for two traveling cranes of 25 and 50 tons capacity, respectively. Part of the side and end walls are brick, but the greater part of the space is made up of



windows. Ample daylight admitted by these windows is supplemented by additional light through a row of windows in the straight sides of the high monitor roof, covered with corrugated concrete slabs. With the minor exception of doors and a few wood bins, the building practically is fireproof.

Floor layout conforms in a general way to that of all modern general jobbing foundries. Large, heavy castings are made in flasks or in pits in the center bay. Medium weight castings are made in one of the side bays, and light castings are made in the remaining side bay where the metal is poured from hand or shank ladles.

Cores are made in a side extension near the end of the north bay, also in a space at the end of the bay itself. Exceptionally large cores are made in a space at the east end of the center bay where the traveling crane is available for handling the loads. The smaller cores are dried in gas-fired rack type ovens. The large cores are loaded on a car and dried in an oven in the vicinity also fired with gas.

Molds in the north bay are made on jolt ram rollover machines and placed on the floor where they are finished and black washed and then skin dried, cored and closed. Repetition patterns are mounted on boards which also carry—where necessary—suitable blocks of hollows for forming irregular parting surfaces between copes and drags. Special gating systems developed through many years experience form part of the pattern equipment. These gates are designed to deliver clean iron for castings which in practically all cases must pass the most severe inspection for surface appearance and interior freedom from any form of defect.

A form of instinct or sixth sense developed through many years observation and experience, a sense which in many instances ignores or defies the rules and regulations, the usual sign posts and the beaten path, has enabled the superintendent to eliminate risers and feeding heads from approximately 25 per cent of the castings. Broadly speaking, the theory is based on the fact that every casting contracts or shrinks to a definite extent. This shrinkage or contraction is uniform in castings of uniform or fairly uniform thickness of metal; therefore, there is no need to provide any reservoir in the shape of a riser or feeding head. The casting as a whole simply goes into smaller bulk than the pattern.

Presence of a large core or cores is an important factor in the anticipation or prevention of shrinkage defects in a casting. While the casting is contracting, the core is expanding. The result, to some extent, is similar to that of the process recently developed of squeezing a casting in a press or other mechanical device to increase homogenity and density of the metal.

Feed Through Side Riser

Where feeding through a riser or sinkhead actually is essential, it has been found that a side riser, where conditions are favorable, is more efficient than one placed in the orthodox or usual manner on top of the casting. In the past, one of the main objections to the side riser was the trouble, time and expense involved in removing it from the casting. This problem has been solved by connecting the riser to the casting by a number of small passages through a thin dry sand slab core. The connecting metal teats easily are removed in the cleaning room.

An outstanding example of a casting from which risers have been eliminated is a tank or shell made in sizes from 4 to 10 feet in diameter and from 6 to 10 feet in height. The large size with a 2-inch thick flange top and bottom on the outside and a metal thickness of 1¼ inches in the upright wall is molded from a metal ring pattern 5 feet in height. When the sand is rammed to the top, the pattern is pulled up a short distance and sand is rammed around it. This is repeated until the mold is the correct height for the casting. Flanges top and bottom are formed by a number of wood segments. The flanges have the usual allowance of ¼ to ½-inch for machine finish, but no provision is made on the top flanges for either the usual type of risers, or for a 4 to 6-inch extension of the flange to serve as head metal.

When the mold has been finished, black washed, dried and closed, the open top flange is covered with a number of segment cores which serve the double purpose of cope and pouring basin. Metal enters the mold through a ring of small pop gates in the bottom of the pouring basin. With the basin cores in place, an extra flask ring is added to the stack forming the cheek of the mold and green sand is rammed around the cores to hold them in place.

Success of this method for producing solid castings is ascribed to a combination of contributory factors. Pouring the metal through the (*Please turn to page* 210)

Fig. 4—Turnbuckles in the suspension rods enable the operator to adjust the weight and balance of the load with a nice degree of accuracy. Fig. 5—Large molds are built up in pits in the floor. Core openings are stuffed with waste or old rags during the assembling operation. Fig. 6—Jacket corebox is made up of many parts. Fig. 7—Nice venting problem involved in this set of cores for blower casing. Fig. 8—Jacket cores are made and dried in halves and afterward pasted together. Fig. 9—Cores shown in Fig. 7 as they appear when assembled in the mold

QUESTIONS and

Making Wood Fire Retardant

Q.—Due to scarcity of wood and labor shortage we are interested in coating materials which will render wood foundry flasks and flask bars fireproof or high temperature resistant. Can treated wood be obtained, or can coating materials be purchased? If not, what materials can be used and what are the formulas for such compounds?

A.—We understand that wood can be made fire retardant by application of coatings which contain borax, ammonium phosphate, sodium silicate, sodium tungstate, etc., but generally those are used on building or factory woodwork to delay ignition or combustion in case of fire. Possibly such a coating might work for the purpose you have in mind, but that only could be determined by actual experiment. We believe that you would be much better off to secure metal flasks and bottom boards than to try and coat the wood.

However, if you want to experiment you might try a mixture of borax dissolved in a dilute solution of sodium silicate. National Lead Co. suggests the following for fire retardant paint: Outside white or exterior primer 1 gallon, borax 11 pounds, boiled linseed oil 3 pints, and turpentine 1 pint, or paste white lead 25 pounds, borax 17 pounds, raw linseed oil 1¼ gallons, turpentine 1½ pints, and liquid drier ½-pint.

Undoubtedly, the best procedure for insuring the highest value of retardance is to impregnate the wood with ammonium and zinc salts. However, to do it properly you would have to have suitable equipment such as autoclaves, vacuum pumps and pressure pumps. Method would be to place the dry wood in the autoclave and subject it to a vacuum. While under the vacuum the hot solution of ammonium and zinc chlorides would be admitted followed by the application of pressure. That would insure the salts permeating the structure of the wood.

Pin Holes on Interior Surface

Q.—In making centrifugal cast bronze bushings we are having difficulty with small pinholes on the interior surface as shown on the accompanying specimen. The alloy contains 86.99 per cent copper, 7.68 per cent tin, 0.78 per cent lead, and 4.20 per cent zinc. We pour at 2150 degrees Fahr. in a horizontal machine rotating at 1700 revolutions per minute. We use a graphite spray to coat the mold. Bushing weighs 32 pounds, and some come out perfect and others with the holes.

A.—While you mentioned the speed of rotation of the mold you did not state the diameter of the casting nor its length. However, we estimate that it is about 6 inches outside and since the wall is about ½-inch, the length would be about 10¾ inches. Use of a graphite spray would indicate that an iron mold is used. Examination of the section sent to us leads us to the opinion that the holes on the interior surface may result from several causes.

One of the first suggestions is to study the type of mold coating or its method of application to see whether or not it is at fault. If you will look carefully at the exterior surface you will note that in addition to the generally pock-marked condition, that it also contains some of the same discolored holes which appear on the interior surface. If the graphite is mixed with oil to form the spray, we suggest that you switch to a water-base type. Possibly at times too thick a coating is applied which flakes off and becomes entrained in the molten metal.

Another point to study is your pouring temperature. It would be wise to determine the best temperature by experiment, and then use a pyrometer at the time of pouring to see that it is correct. Our suggestion would be to try a somewhat lower temperature, say 2100 degrees or less.

A final consideration is mold speed and construction of your casting machine. It is quite possible that your mold tends to vibrate at the speed of 1700 revolutions per minute, and according to an investigation by Northcott and Dickin in England that will result in banding or difference in structure and a porous surface on the interior. Those conditions as might be expected, are more pronounced on thicker sections, and not so evident on a thinner section such as you have. To determine whether or not banding has occurred, it is advisable to deep etch a roughly ground section by immersion in a mixture of 90 per cent concentrated nitric acid and 10 per cent hydrochloric acid for 6 to 10 minutes.

Northcott and Dickin also found that structure of the casting is influenced by mold speed, rate of pour, mold temperature and metal temperature, and some of those have a greater effect than others. Hence, under one set of conditions certain results will be obtained which will not be exactly the same with a change in one or more of the variables.

Data on Casting Monel Metal

Q.—We will appreciate any information you can give us on sand casting of monel metal such as sand, molding, facings, patterns, etc.

A.—Your inquiry on monel metal castings covers a wide territory, and we can only give you a few of the essentials. Sand for monel metal is quite similar to that used for making steel castings. One suggested is composed of clean silica sand of 65 to 80 grain fineness number (A.F.A.) to which is added about 15 per cent high quality fireclay. Moisture content of the sand as used is about 5.5 per cent. That sand may be used green or dried. Often the molds and cores are given a wash of silica flour to produce a smooth skin. Shrinkage of monel metal is ¼-inch per foot or about that of steel, and it is essential that heavy risers over thick sections be employed to insure solid castings. Molds for light castings may be made in green sand, but usually medium and heavy castings are made in dry sand.

Metal may be melted in oil-fire crucible furnaces. Oil should be low in sulphur since that has a deleterious

and ANSWERS

effect on the metal. Monel metal for casting should contain around 1½ per cent silicon. The alloy is susceptible to gases, and consequently, should be melted as rapidly as possible. Pouring temperature ranges from 2700 to 2800 degrees for light section castings. Just before pouring monel metal should be degasified with the addition of 1½ ounces of metallic magnesium per 100 pounds of metal. The magnesium should be plunged well beneath and held beneath the surface until dissolved. Otherwise its effect will be of little value.

Brass Pipe Plugs Show Blows

Q.—We are sending you several specimens of bronze pipe plugs with which we are encountering considerable difficulty due to blows causing 25 to 30 per cent scrap. They are made in 10 x 16-inch snap flask with 3½ inch copes and 2½-inch drags. Two gates and two sprues are molded in a flask. We try to squeeze as soft as possible, and use sand as dry as possible. Sand mainly is Albany 0 with a small percentage of Albany 00. Molds are poured from the end which is raised 10 to 15 degrees. Will facing sand clear up the trouble?

A.—Your difficulty with blows in the hollow portion of the pipe plugs is due to the inability of the gases generated to escape through the remainder of the sand in the drag. Possibly the bottom boards may be fitted too tightly, but our opinion is that the sand is too tight. We believe that you would be able to eliminate most of the blows by going to a coarser sand such as No. 1 Albany. It may be that your sand heaps have been so long in use that they contain considerable fines, and hence, they might be much nearer to No. 00 than No. 0.

If there is some reason why you do not desire to change to a coarser sand, the blows might be eliminated by adequate application of a vent wire; especially reaching up into the hollow portion of the plug. Since you are using a squeeze machine, it would be a simple matter to construct a vent plate which while requiring another operation—at least would insure accurate venting. Vent plate yould be a metal plate or wood board to which a number of 3/16-inch diameter rods or spikes would be affixed. They would equal the number of castings, be located on the same centers, and long enough to penetrate to within say 5/16-inch of the top of the hollow portion.

Another solution of your trouble might be to use a much thinner drag—say perhaps 1¼ or 1½ inches deep with a loose fitting or preferably a perforated bottom board. As you can see, the less sand the gases have to penetrate, the easier they will escape.

Outlines Cement Mold Mixture

Q.—Please supply us information concerning the making of air dried cores and molds.

A.—Before making any remarks about cement molding compositions, it might be well to point out that so far as we know, the process is a proprietary one, and before embarking in that field, it is advisable to give the situation careful study.

In cement molding available information indicates that high early strength cement is preferable to regular portland cement since the air setting period is much shorter. Amount of cement added to the sand which is a 40-grain (A.F.A. standards) silica sand, is from 10 to 11 per cent. Moisture added to give a workable mixture is 6 per cent by volume or 4½ per cent by weight. Mixture is mulled similarly to molding sand. At normal temperature say 70 to 80 degrees Fahr. the sand should be used within 2½ hours after mixing; with higher temperatures of 100 degrees and over the sand must be used within one hour.

In many cases the old cement bonded sand is broken or ground up, cement added and used as a backing sand —the facing being composed of new sand mixture to get a smooth surface on the castings. Also in some cases cement sand molds are coated with blacking or graphite wash. In large castings where a considerable quantity of metal flows over the gate area, the casting face in that section tends to be rough. Consequently, it is advisable to use several gates to minimize that effect. We also understand that a zirconium sand mixture is used on gates where much trouble is encountered. That material is more refractory than silica sand and resists burning-in.

GANGWAY!

By J. A. Patterson

"I don't give a hoot if you don't look good in glasses—put these on or you won't 'look' at all!"

Compare Permanent And Sand Molds

Q.—Considering the permanent mold and the green sand mold for making bronze sanitary ware castings, which is the more advantageous method? What is the best material for a permanent mold? How many castings of the type indicated can be produced for a permanent mold before it has to be repaired or discarded?

A.—Without attempting to compare the sand method and the permanent mold method point by point in the production of bronze faucets and other plumbers' castings, it may be sufficient in the present instance to point out that practically all these castings are made in green sand molds. Presumably men engaged in this branch of the foundry industry have given serious thought to the problem and are satisfied that the green sand method is the more advantageous of the two. In several places large, hydraulically operated machines have been installed for injecting the molten metal into the mold under pressure, but that probably is a feature which does not enter into your present calculations.

A good grade of gray iron is used in the construction of permanent molds for gray iron castings. Since it has proved satisfactory in gray iron practice, it should be equally satisfactory, if and when it is used for brass and bronze where the processed metal is not as high in temperature as molten iron. Since the permanent mold process is not used to any extent in the brass foundry there are no available figures on the life of the molds. However, in the gray iron industry where permanent molds are employed, record runs of 100,000 castings are not unusual.

Pattern Cost Borne By the Buyer

Q.—We shall appreciate your opinion on the subject of pattern replacement. For example a customer supplies a pattern with an order for a certain number of castings. Through natural wear and tear the pattern reaches a stage where it is no longer serviceable. To continue with the order, a new pattern is required. Who supplies the new pattern, the customer or the foundry? We maintain that if the pattern develops a defect through any negligence on our part, we bear the cost of repair, or if necessary a complete new pattern. Where the pattern becomes useless through constant use, and where the customer supplied the pattern in the first place, we claim that he should supply a new pattern for continuity of production on the order.

A.—Your claim is based on plain common sense and the ordinary brand of honesty and fair dealing which prevails among business men. If any reasonable doubt exists that such a situation might arise, the prudent foundryman has a distinct understanding on the subject, before accepting the contract. Where a customer supplies a pattern at the beginning of the contract, it is only fair to assume that the party of the first part and the party of the second part regard it as an obligation on the part of the customer. If the pattern wears out before the job is finished, the obligation of the customer to supply a new pattern, is just as reasonable, as his obligation to supply a new pattern if he wants to incorporate a change or changes in design.

Many associations, including the Gray Iron Founders Society; the Malleable Founders Society; National Association of Purchasing Agents, have incorporated the items in their Standard Sales Agreement and Trade Customs. According to the Gray Iron Founders' Society "The

foundry is not responsible for loss of or damage to patterns by fire or other casualties beyond its control" and "Repairs and changes to patterns by customer's orders will be made customer's expense."

The Malleable Founders' Society is even more explicit: "Pattern equipment, properly gated and of a type suitable for the economical production of castings of the required quality, quantity and delivery schedule, is furnished by or at the expense of the customer, who pays transportation charges, including packing costs to and from the foundry. The patterns, coreboxes and loose pieces thereof should be properly marked for identification. Alterations or repairs, such as made necessary by change of design or by *wear*, are made at the expense of the customer."

Measure Shrinkage On Steel Gear

Q.—We are enclosing prints of two steel castings, one is a herring bone gear 84 inches diameter, 18-inch face, eight flat arms with a rib top and bottom. The other is a spider 10 feet, 7 inches outside diameter, eight flat arms flush with face of the hub on one side and with a deep rib on the center of each arm on the other side. Wheel and spider are split. What amount of shrinkage should be allowed, particularly on the inside diameter for (a) plain 0.25 per cent carbon steel, and (b) steel with 0.25 per cent carbon, 1.5 per cent copper and 0.90 per cent manganese? What is the usual shrinkage allowance for steel gears 3 feet and over in diameter?

A.—A direct answer to your inquiry would be to allow 3/16-inch per foot on the outside diameter and ⅛-inch per foot on the inside diameter. In addition, the usual procedure is to add a ¼-inch thickness to the inside rim as a safety factor. The same shrinkage allowance is provided on gears 3 feet and over in diameter. The only difference here is that the extra thickness on the 3-foot wheel is only ⅛-inch, and gradually is increased up to the maximum ¼-inch in the wheel 7 feet in diameter. However, many variable factors must be taken into consideration, including method of making the mold, rigidity of the rigging, temperature of the metal. Obviously, a casting made in a sand mold will not be as absolutely true and accurate as one turned and cut on a machine. A mold in which the teeth are formed with the aid of a spindle, sweep and tooth block, either a temporary setup, or a regular gear molding machine will be more accurate in shape and dimensions than one in which the outside face and teeth are formed in a set of segment cores assembled against a sand wall. If the mold and rigging are not sufficiently rigid to resist the pressure of the molten metal, the resulting distortion will, or rather may, neutralize the shrinkage allowance. Hot metal will shrink to a slightly greater degree than cold metal. The foregoing variables apply to all large castings, but invite the closest care and attention in the production of large gear wheels which usually are held to fairly close tolerances. Composition of the metal is not a factor in deciding on the shrinkage allowance.

Melt All Scrap for Plumbers' Goods

Q.—Please give us suggestions or recommend a book which deals with bronze castings, compositions and alloys for bronze and all data concerning fittings for sanitary ware.

A.—We do not know of any book that deals exclusively with the composition and manufacture of castings known under the general term sanitary ware or plumbers' fittings. An article dealing with many interesting features in the operation of a foundry specializing in the production of castings used in the plumbing trade was presented in the August, 1940 issue of THE FOUNDRY.

Considerable variation exists in plumbing casting alloys. Some makers favor yellow brass, while others use red alloys. The main purpose in many cases is to use as inexpensive a metal as possible. A typical all scrap mixture contains 75.5 per cent sheet brass clippings; 25 per cent copper wire; 2 per cent lead; 1 per cent tin and 0.5 per cent 15 per cent phosphor copper. The copper wire is charged first. When it begins to sink, a worn out dry battery is thrown in with a small shovelful of charcoal. After the copper has been melted and the phosphor-copper added, the clippings are charged. At this stage it is customary to place a ring on the crucible to

(*Concluded on page* 116)

NEW ALLOY IRONS BREAK ENGINE BOTTLENECK

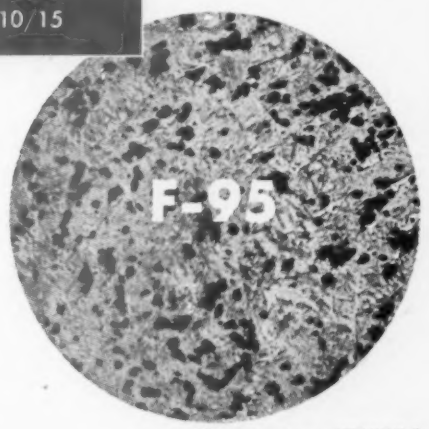
Piston ring irons containing NICKEL speed heavy duty engines into operation

● *Microstructure of "F-37" alloy iron, heat treated. (250 x. Picral etch.) "F-37 is a high carbon cast iron that assures non-galling and wear-resistant qualities. Minimum tensile strength 65,000 psi.*

TYPICAL PROPERTIES

	Standard Gray Iron for Piston Rings	F-37	F-95
Tensile Strength, p.s.i.	41,200	72,400	108,800
Rockwell Hardness	101(B)	30-C	33-C
Elastic Modulus, p.s.i.	11.9×10^6	$17.-18. \times 10^6$	$22. \times 10^6$
Modulus of Rupture, p.s.i.	———	117,000	190,000
Izod Impact* (inch-pounds)	3	5	10/15

**Comparative values obtained from breaking .14" x .26" x 3.0" bars in an inch-pound Izod test machine.*



● *Microstructure of "F-95" alloy iron, heat treated. (250 x. Picral etch.) "F-95" contains a higher Nickel content than the "F-37" iron and possesses a tensile strength in excess of 100,000 psi.*

● Where increased performance of aircraft engines demands improved quality piston rings, two new and vastly improved compositions containing Nickel provide the necessary strength and stamina.

Not only do these newly available alloy irons resist wear, vibration, fatigue and shock, but they maintain dimensional stability at the high temperatures encountered in engine operation.

Developed by the American Hammered Piston Ring Division of Koppers Company, Inc., these new ring materials of heat-treated grey iron alloyed with Nickel, chromium and molybdenum, afford the inherent advantages of cast iron in addition to essential sturdiness.

Automotive and aircraft rings of these new alloy irons are cast in a stack or "christmas tree" as shown above. All are given a heavy porous chromium plating further to enhance wear resistance, a practice instituted by the Navy Department several years ago.

An alloy containing Nickel may improve your product. Send us details of your problems, for our recommendations.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET NEW YORK 5, N. Y.

(*Concluded from page 114*)

increase the height. As the clippings become red, they are pushed down into the molten copper. The tin then is added, followed by the lead. The metal will smoke considerably and should be poured when it has ceased to boil or impart vibration to the skimmer. The surface of the metal can be seen by blowing the smoke away and should appear bright. Metal should be poured rapidly into the molds to prevent a smoky skin on the castings.

Wants Information On Small Cupola

Q.—In one of your issues in 1942 a brief description of some small cupolas in Australia was presented, but we cannot seem to locate the article. Could you tell us when it appeared, and supply us with pertinent data on tuyeres as to number and location, etc.?

A.—The information on the small cupolas was presented in the August, 1942 issue on page 118, and mentions two sizes. One lined to 24 inches has 6 tuyeres in two rows and staggered. Tuyeres are 4 x 6 inches at lining and 4 x 4 inches at shell. Bottom row is 14 inches above sand bottom, and the top row is 18 inches above the bottom. Inside wind belt 12 x 15 inches the tuyere openings are fitted with butterfly valves. Slag hole is 11 to 12 inches above sand bed. Coke bed is 364 pounds and extends 18 to 20 inches above the tuyeres. Iron charge is 560 pounds and coke splits are 45 pounds with 60 to 70 pounds of limestone per ton. Cupola melts 2½ tons per hour consistently.

Smaller cupola is lined to 18 inches, and has 4 tuyeres. Coke bed is 250 pounds and extends 18 to 20 inches above the tuyere. First iron charge is 336 pounds and subsequent charges 168 pounds with 18-pound coke splits. Extra hot iron is taken from the cupola at the rate of 2500 to 2800 pounds per hour.

Use Ring of Gates On Bushing Top

Q.—Recently we read a description of molding methods for nonferrous bushings which advocated use of a ring of pop or pencils gates and top pouring. We would like to know if a similar procedure can be employed for production of solid bushings of gray cast iron which are 6 inches in diameter and 12 inches long?

A.—There is no reason why the gray iron bushing cannot be poured through pencil or pop gates successfully since that practice is followed by many foundrymen. Our suggestion would be to use a ring of eight gates equally spaced around a 4-inch circle with the gates about ½-inch in diameter. With such a gating system, the casting usually is made several inches longer than actually desired, and the extra length which later is cut off serves as the feeding head or riser. One advantage of the pencil gate system is that the final hot metal is placed where it is needed most—not in the riser but in the casting.

By experimenting you can determine the proper size of hole for the gates which practically will eliminate the need for the extra length. In other words the gates will be such as to admit metal at approximately the rate it solidifies. Another method of making the bushing would be to pour into a centrally located basin of baked core sand with a 1½ or 2-inch hole in the center. The basin will serve as the riser, and you need not worry about freezing off as the hot metal below and the hot metal in the basin will keep the opening between the two bodies of metal open. The basin opening should be the same size as the bushing, and have a flat bottom about an inch thick. After the casting has solidified the connecting gate and riser can be knocked off easily.

Coloring Agents for Pattern Work

Q.—A recent issue of THE FOUNDRY carried the standard pattern colors adopted by the A.F.A., and we would like to know where additional copies may be obtained. Also can you recommend a pigment for the red color in pattern work? We use lampblack in shellac and alcohol for black, and would like to use the same base for red. Also can you recommend a white or aluminum finish which would be satisfactory for patterns? We have in mind substituting white or aluminum for black for the main body of our patterns to increase see-ability of them in use and in storage.

A.—A survey conducted a few years ago by Frank Cech and Vincent Sedlon and available in the *Transactions* of the A.F.A., Vol. 48, 1940, indicates that vermilion is the preferred pigment for red. Either English vermilion or the domestic variety may be employed. Users of the higher cost English variety believe that better results are obtained than with the domestic type. Procedure recommended is to mix the pigment with sufficient solvent to form a paste and then thin it out to add to the shellac. It should be strained through a cloth while adding, and enough pigment should be added to obtain the desired color.

Similarly aluminum powder such as available for paint can be mixed and added to the shellac. Some patternmakers are using it, and claim that better drawing results as well as a longer wearing surface. However, others claim that aluminum pigmented shellac wears too fast and has no advantages. Consequently, you will have to try it out for yourself, and draw your own conclusions. One point stressed in the paper is the use of a good shellac solvent to obtain drying quality. Use of oxalic acid to clear the shellac is frowned upon as it causes deterioration of the material.

Extra copies of the pattern color chart may be obtained from the American Foundrymen's Association, 222 West Adams St., Chicago, for 5 cents each.

Increase Phosphorus In Copper Alloy

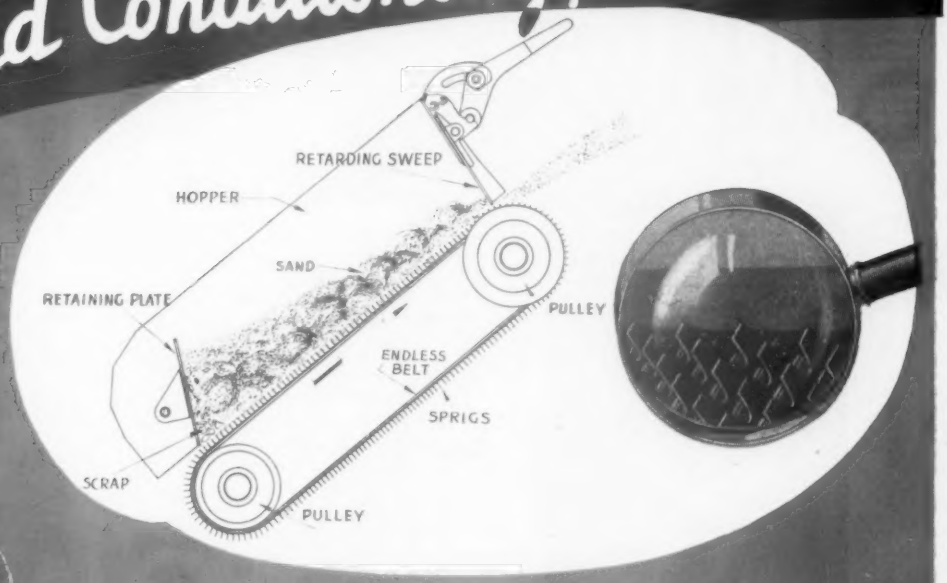
Q.—We will appreciate information on SAE 64 ingot which contains no phosphorus. Can you tell us how much 15 per cent phosphor-copper should be added to produce a phosphorus content of 0.25 per cent? Metal is covered with glass and melted with gas. We pour at 1850 degrees Fahr. which we believe is about right for the alloy. We also melt the same alloy in an open-flame, gas-fired unit, and the metal is difficult to keep covered due to the flame.

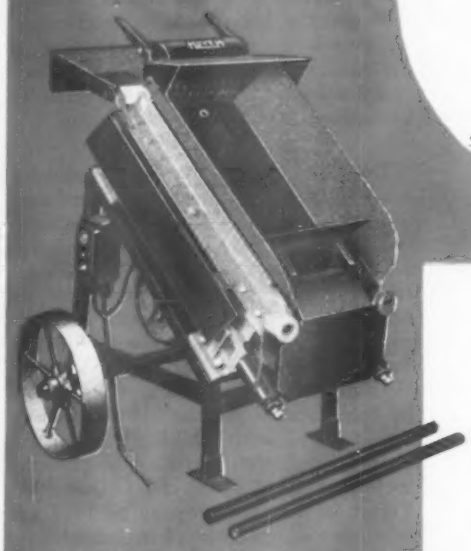
A.—While you mention that the SAE 64 alloy ingot you have does not contain any phosphorus, we wonder if some mistake has been made since it usually contains at least 0.05 per cent. Consequently, it might be wise to calculate the amount of phosphor copper required on two bases—one without any phosphorus in the ingot, and the other with 0.05 per cent. Without phosphorus in the ingot it will require 26½ ounces of 15 per cent phosphor-copper per 100 pounds of metal to provide a phosphorus content of 0.25 in the alloy. However, some of that might act in a deoxidizing capacity so that it may be necessary to increase the amount to 27 or even 27½ ounces to arrive at a final content of 0.25 per cent. Just what will be required will have to be determined by experiment. In the case of the alloy containing 0.05 per cent phosphorus to start with, you only will have to add 20¼ ounces plus one-half or one ounce.

Your pouring temperature of 1850 degrees appears to be on the low side, as the usual range is 1900 to 2200 degrees Fahr., or an average of 2050 degrees Fahr. It is quite possible with the higher phosphorus content, a lower pouring temperature can be employed. As far as fluxes or covers are concerned a considerable difference of opinion exists as to their value. Some claim that no flux or cover is needed if proper furnace atmospheric conditions exist, and that use of a cover tends to slow down melting as well as sometimes being a collector of gases which are transferred to the metal. Glass is used widely as an inert cover. However, some claim that a flux cover composed of soda ash and borax serves excellently for the high-lead bronzes, but it is somewhat hard on the crucible at the slag line. Addition of glass or sand is said to decrease considerably the cutting action.

As far as the cover on the metal melted in the open-flame furnace is concerned, we do not believe we would worry too much about it, in view of previous remarks. However, if you feel that it is necessary to maintain a solid cover, you might try the addition of lime to the glass. Caution must be used in the addition since you might create a slag so viscous that difficulty will be encountered in removing it from the furnace. Remedy of course would be to add glass or sand to thin it out.

Basic Sand Conditioning!





Royer Model "NC-2." Capacity 450 to 550 lbs. per hour.

What The Royer Does For Your Sand

Over 6,500 Royers are in service because they provide better sand preparation and lowest sand conditioning costs through correct design, construction and operating principles. The sketch shows how the Royer functions.

Over the two pulleys and at an angle of 45 degrees runs the endless Royer combing belt with its staggered rows of heat treated chrome-molybdenum sprigs or teeth which form pockets between the sprigs.

A wide hopper guides the sand on the belt. A movable retaining plate at the lower end of the hopper holds back the sand load and permits scrap discharge. At the upper end a retarding sweep holds back scrap and other contamination.

The sand—shoveled or conveyed into the hopper—falls upon the combing belt which travels in an upward direction, as pictured. The steel sprigs comb the sand in the hopper into granular form; the grains gravitating into the pockets. The thorough mixing and blending of the sand is due to the spacing of the sprigs on the belt, the speed of belt travel and the force of gravity. As the pockets pass over the upper pulley the sand is thrown forward through the air by centrifugal force for a final and thorough aeration. Scrap, burned cores and other refuse gravitate to the lower end of the hopper where they are discharged by merely tripping the retaining plate.

This method provides properly prepared sand, reduces sand conditioning costs and greatly lowers new sand and bond requirements, preparation labor and time.

There is a Royer model, stationary or portable, for every foundry requirement. Write for Bulletin 744.

Only Royers Provide Six Point Sand Conditioning!

1. Thorough refuse removal
2. Positive lump breaking
3. Complete blending and mixing
4. Even distribution of moisture
5. Increased permeability
6. Double aeration

THE ROYER FOUNDRY & MACHINE CO.
KINGSTON, PENNSYLVANIA

FOREMOST IN SAND CONDITIONING EQUIPMENT

MEN of Industry

HENRY F. POPE

HENRY F. POPE has resigned as chairman of the board of directors, National Malleable & Steel Castings Co., Cleveland. Mr. Pope has been active in the company since he began as office boy with its predecessor, Cleveland Malleable Iron Co., in 1884, and has served in various capacities including those of assistant treasurer, vice president and president. He has been a director since 1899 and has been chairman of the board since 1934. Mr. Pope continues as a director, but the office of chairman has been left vacant.

♦ ♦ ♦

G. D. Thompson, chairman of the board, Pittsburgh Steel Foundry Corp., Glassport, Pa., has been elected president of the company. Mr. Thompson, who has been a member of the board of directors for the past 6 years, became chairman in 1942.

♦ ♦ ♦

Joseph L. Brooks, chief metallurgist, Muskegon Piston Ring Co., Sparta, Mich., has served as president of the Western Michigan Chapter of the A.F.A. during the past year. Mr. Brooks was born in Fremont, Mich., in 1906 and was graduated from the Fremont High School. He then became connected with the Lakey Foundry & Machine Co., Muskegon, Mich., and two years later resigned to accept a position in the laboratory of the Piston Ring Co. of Muskegon, now the Sealed Power Corp. Later he joined the metallurgical department of the Muskegon Piston Ring Co., and advanced through several positions to that of chief metallurgist. Mr. Brooks was active in the organization of the West Michigan Chapter and has been an official or director of the group since its establishment in 1941. He also has been active in national committee work of the A.F.A.

G. D. THOMPSON

♦ ♦ ♦

Joe T. Gilbert, who is serving as chairman of Birmingham District Chapter of the American Foundrymen's Association for 1944-45, is superintendent of production, Stockham Pipe Fittings Co., Birmingham. A native of Eufala, Ala., he attended public and high schools there, and has been associated with Stockham Pipe Fittings Co. since 1920, except for 2 years when he was in the sales and service department of Carolina Refractories Co., Hartsville, S. C. Starting out as a drill press operator at Stockham, Mr. Gilbert subsequently became foundry dispatcher, cupola foreman, superintendent of the malleable foundry, and general superintendent of all foundries, prior to being named to his present position.

♦ ♦ ♦

Donald J. Reese has been appointed head of the newly created iron and nonferrous casting section of International Nickel Co.'s Development and Research Division. Mr. Reese has been with International Nickel since 1936 and recently resumed his duties with the company after almost 3 years with the War Production Board's Steel Division at Washington. Other new sections created by International are the industrial chemical section, with **O. B. J. Fraser** in charge, and the corrosion engineering section, headed by **F. L. LaQue.** Mr. Fraser joined the company in 1917 and continues as director of technical service of International's mill products. Mr. LaQue, associated with the company since 1927, has been engaged since 1940 in development work on applications of nickel-containing alloys.

♦ ♦ ♦

Franklin Farrel Jr. has resigned as chairman of the board of directors, Farrel-Birmingham Co. Inc., Ansonia, Conn., and **Alton A. Cheney** has been elected to succeed him. Mr. Farrel has been affiliated with the company since 1933,

(*Continued on page* 120)

JOSEPH L. BROOKS

JOE T. GILBERT

DONALD J. REESE

SWORDS or PLOWSHARES ?

Whether your foundry is producing hand grenades or pipe . . bomb noses or stoves . . jeep housing or agricultural implements—in fact, any type of casting with exacting specifications—

Uniform
PIG IRON
is Essential

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1883

GENERAL SALES OFFICES: 1515 First National Building • Birmingham, Alabama • Phone 4-6786

(*Continued from page* 118)

and has been a director since 1904. He will continue as a director and chairman of the finance committee. Mr. Cheney, the new board chairman, is a great grandson of Franklin Farrel Sr., one of the founders of the original Farrel Foundry & Machine Co. He has been a director of Farrel-Birmingham since 1931.

Lester D. Chirgwin, general manager of the company's Buffalo plant, has been elected vice president in charge of manufacturing. **Franklin Farrel III,** plant manager, Ansonia-Derby plants, has been named secretary and assistant treasurer. The following officers were re-elected: **Franklin R. Hoadley,** president; **Carl Hitchcock, Armin G. Kessler** and **Austin Kuhns,** vice presidents; **Frederick M. Drew Jr.,** treasurer and assistant secretary. **Carl F. Schnuck,** chief engineer of the company, and **William M. Fraser,** general manager of the Atwood Machine Co., Stonington, Conn., recently acquired by Farrel-Birmingham, have been elected directors.

♦ ♦ ♦

H. A. Forsberg has been appointed manager of operations of all works of Continental Foundry & Machine Co., East Chicago, Ind. Mr. Forsberg has been with the company for more than 29 years, serving as office clerk, order department head, production engineer, assistant and finally superintendent of Chicago Works. **J. E. Johnson** of castings sales, succeeds Mr. Forsberg as general superintendent of the Chicago Works. He joined the company in 1922 and has served as patternmaker, checker, assistant foreman, assistant to the general superintendent, and sales engineer.

♦ ♦ ♦

W. R. Gilmore has been appointed chairman of the board of directors, the Superior Steel & Malleable Castings Co., Benton Harbor, Mich. **R. L. Gilmore,** formerly vice president, succeeds him as president and will continue as general manager. **F. H. Johnston** is vice president and treasurer and **Howard Goodman,** secretary, of the company.

♦ ♦ ♦

J. M. Morrison, southern representative of Ampco Metal Inc., Milwaukee, has established a field engineering office at 818 McGhee avenue, Knoxville, Tenn., and will serve the states of Florida, Georgia, Tennessee, North and South Carolina. Mr. Morrison's office was formerly in Jacksonville, Fla.

♦ ♦ ♦

Dr. Milo J. Stutzman, department of engineering research, University of Michigan, has joined the staff of the Midwest Research Institute, Kansas City, Mo. Dr. Stutzman is a specialist in process metallurgy and has served on the faculties of the University of Pittsburgh, Iowa State College and Kansas State College.

♦ ♦ ♦

P. W. Fromm has become connected with Western Electric Co. Inc., Hawthorne Branch, Chicago, as a time standards engineer. Mr. Fromm has had 20 years of foundry experience, having served as a molder, general foreman, foundry superintendent and time study and general foundry foreman. Previous connections include Kankakee Foundry Co., Kankakee, Ill., Hard Iron Foundry Co., a branch of Kankakee Foundry Co., David Bradley Mfg. Co., Bradley, Ill., and Deere & Co., Moline, Ill. He attended Purdue University and has participated in numerous time and motion clinics sponsored by the Industrial Management Society.

♦ ♦ ♦

C. J. Zaiser has resigned as general manager, Ampco Metal Inc., Milwaukee, but will continue as president. **J. D. Zaiser,** formerly vice president, has been named general manager and executive vice president. **Reinhold Kunz** has been promoted to first vice president and **George K. Dreher,** second vice president. **R. W. Uecker** continues as secretary-treasurer, and **Paul Knudsen** as office manager and assistant secretary.

♦ ♦ ♦

James E. Campbell, formerly associated with the General Motors Research Laboratories, Detroit, has been appointed to the technical staff of Battelle Institute, Columbus, O., and assigned to its division of physical metallurgy. Mr. Campbell attended the University of Michigan and received his degree in chemical engineering from the University of Minnesota.

♦ ♦ ♦

P. C. Beck has been appointed chief metallurgist of the Castings Division, Reynolds Metals Co., Springfield, Mass. Mr. Beck formerly was associated with the Aluminum Co. of America in Cleveland.

♦ ♦ ♦

N. W. Briskin, at one time active with Ford Motor Co. and later with Permanente Metals Corp. in California, is now serving as assistant general manager for the Nonferrous Foundry Co., Detroit.

♦ ♦ ♦

John E. Holtman has been transferred by American Manganese Steel Division of the American Brake Shoe Foundry Co., from Denver to St. Louis, as works manager.

♦ ♦ ♦

Donald B. Hornbeck has been elected president, National Bronze & Aluminum Foundry Co., and its subsidiary, National Aluminum Cylinder Head Co., Cleveland.

♦ ♦ ♦

Wilson C. Moriarty, assistant to the president, National Malleable & Steel Castings Co., Cleveland, and responsible for the direction of general policies

(*Concluded on page* 122)

PREPARE I.B.F. EXCHANGE PAPER FOR 1945

W. A. BAKER

E. A. G. LIDDIARD

ANNUAL exchange paper for 1945 of the Institute of British Foundrymen to the American Foundrymen's Association has been prepared by **W. A. Baker** and **E. A. G. Liddiard** of the British Nonferrous Metals Research Association. The paper is entitled "Cause and Control of Microporosity in Magnesium Alloys."

Mr. Baker, born in 1912, was assistant chemist at the Royal Mint, London, from 1929 to 1935. He was graduated with honors as bachelor of science in metallurgy at the London University in 1934 and joined the staff of the B. N. F. M. R. A. as junior investigator in 1935. Since 1939 Mr. Baker has been senior investigator in charge of the association's researches on melting and casting of nonferrous metals.

Mr. Liddiard, born in 1903, was laboratory assistant at the Cyclops Steel Works of Messrs. Camel Laird & Co. Ltd., Sheffield, from 1922 to 1925. He was graduated with a bachelor of arts degree from Gonville and Caius College, Cambridge, in 1928, and received his master of arts degree in 1932. He was research metallurgist with I. C. I. (Synthetic Ammonia and Nitrates) Ltd., Billingham, from 1928 to 1932, and was appointed assistant development officer to the B. N. F. M. R. A. in 1932. Mr. Liddiard became assistant research superintendent in 1938 and research manager in 1943.

THE LAST *DROP* IS AS GOOD AS THE FIRST

Ask the Men Who Use It!

DON'T WAIT FOR THE COW TO COME IN TO BE MILKED..... GO AFTER THE COW!

... and when you want good castings ... it pays to go after GOOD OIL! DAYTON OIL is the best that money can buy. It works clean in the core boxes ... and its even-drying qualities are designed to meet every foundry baking condition. Ask the DAYTON OIL man for the facts ... it will pay in the long run.

The

DAYTON OIL COMPANY

DAYTON 1, OHIO

STEEL CORE AND MOLD WASHES - BINDER AND CORE PASTE - CORE WASHES - CHILL COATINGS

(*Concluded from page* 120)

and co-ordination between the five plants of the company for all industrial sales, has been assigned the additional duties of assisting in the administration of the railway sales department.

♦ ♦ ♦

Dr. J. R. Van Pelt Jr., until recently technical director of the Museum of Science and Industry, Chicago, has joined the staff of Battelle Memorial Institute, Columbus, O., in charge of a program of research education for returning veterans who have college degrees and who can qualify for postgraduate training in the sciences. Dr. Van Pelt is vice president of the American Institute of Mining and Metallurgical Engineers, a trustee of Cornell College, Iowa, and has served as consultant on educational matters to various institutions.

♦ ♦ ♦

N. K. Daerr has been appointed sales manager, Fort Pitt Steel Casting Co., division of the H. K. Porter Co. Inc., Pittsburgh. Prior to his appointment in 1940 as sales engineer in charge of eastern territory, Mr. Daerr was manager of the manufacturing division of the Fort Pitt company. Other appointments include **S. B. Nicholson,** associate sales manager; **Harry J. Hatt, H. Ellwood Rankin,** and **M. K. Murray,** sales engineers.

♦ ♦ ♦

J. F. Nicholl, after June 1, will be associated with the Lumite Division of Chicopee Mfg. Corp. of Georgia, in the New York office. Mr. Nicholl was formerly sales manager of the Chemical Division, Marathon Corp., Rothschild, Wisc. **Dr. Carlyle Harmon** remains as head of Marathon's Chemical Division, and **Alvan De Long** is in charge of its home sales office.

♦ ♦ ♦

William T. O'Connor has been elected vice president in charge of purchases, Manning, Maxwell & Moore Inc., Bridgeport, Conn. Mr. O'Connor was purchasing agent of the American Schaeffer & Budenberg Co. when it was acquired by Manning, Maxwell & Moore in 1928 and was retained as its purchasing agent at that time.

♦ ♦ ♦

William O. McMahon has resigned as southern area technical consultant of the Gray Iron Founders' Society, due to his recent appointment as Birmingham district sales manager for Pittsburgh Metallurgical Co. Inc., Pittsburgh.

♦ ♦ ♦

E. W. Romig has been made vice president in charge of the Cleveland district, Claud S. Gordon Co., Chicago. Mr. Romig has been chief engineer of the Cleveland plant since he joined the company in 1938.

♦ ♦ ♦

George Steven has been appointed executive engineer of the Buffalo Works of Worthington Pump & Machinery Corp., Harrison, N. J. **Harold W. Whiting,** formerly Mr. Steven's assistant, has been appointed to succeed him as chief engineer of the Buffalo Works compressor division.

♦ ♦ ♦

Nigel H. Bell has been named director of the Aluminum and Magnesium Division, War Production Board, succeeding **George C. Heikes,** who has resigned to return to private industry after serving nearly 3 years at Washington. Mr Bell has been with WPB since November, 1942, recently as chief of the Fabrication Branch of the Aluminum and Magnesium Division.

♦ ♦ ♦

William L. Garner recently accepted an executive position with Pratt & Letchworth Co. Inc., Buffalo, a company he left 14 years ago to specialize in electric steel castings practice in the mid-

WILLIAM L. GARNER

west. After serving as foundry superintendent with West Michigan Steel Foundry Co., Muskegon, Mich., he became plant superintendent, Chicago Steel Foundry Co., Chicago, and for the past three years had been plant superintendent, Calumet Steel Castings Corp., Hammond, Ind.

♦ ♦ ♦

Tracy C. Jarrett, chief metallurgist, Koppers Co. Inc., American Hammered Piston Ring Division, Baltimore, has been appointed to the technical committee of the Gray Iron Founders' Society.

♦ ♦ ♦

D. P. Morgan has been appointed assistant sales manager of the Philadelphia district of the Pittsburgh Steel Foundry Corp., Glassport, Pa. Mr. Morgan was formerly sales engineer for the Hanna Stoker Co., Cincinnati.

♦ ♦ ♦

C. P. Pesek has been appointed administrator of engineering, Minnesota Mining & Mfg. Co., St. Paul. **W. A. Thomas,** assistant chief engineer, has been made engineering consultant on Mr. Pesek's staff.

♦ ♦ ♦

Stephen A. Laurich, chemical engineer, has joined the staff of Battelle Institute, Columbus, O., where he will be engaged in research in nonferrous metallurgy. Mr. Laurich, a graduate of Case School of Applied Science, formerly was associated with the Ferro Enamel Supply Co., Cleveland.

♦ ♦ ♦

Commander R. E. W. Harrison has rejoined the Chambersburg Engineering Co., Chambersburg, Pa., as vice president in charge of sales, following his release to an inactive duty status after 4 years in the Navy Department.

♦ ♦ ♦

S. M. Luce has been appointed division manager in charge of the Dallas, Tex., branch of the Fire Extinguisher Division, General Detroit Corp., Detroit, and will handle distribution of products in the South and Southwest.

♦ ♦ ♦

William A. Rock has been appointed resident engineer in the Corpus Christi, Tex., area for the Foxboro Co., Foxboro, Mass. **James M. Tuttle** has joined the staff of engineers attached to the Pittsburgh office of the company.

Book Review

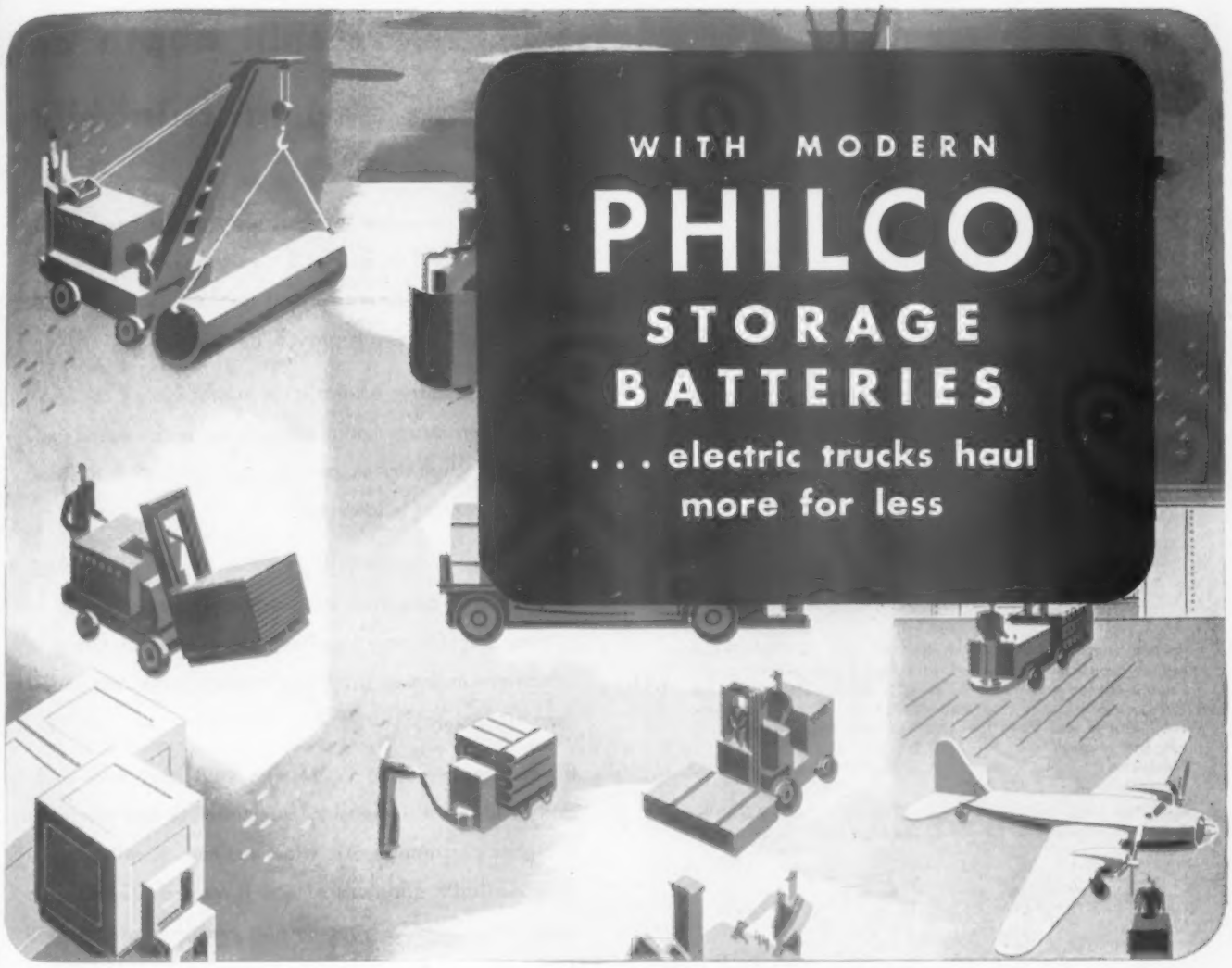
Transactions of the American Foundrymen's Association; cloth; 1393 pages published by the American Foundrymen's Association, Chicago.

Volume 52, largest up to the present, covers the proceedings of the forty-eighth annual meeting of the association held in Buffalo, April 25 to 28, 1944, and follows the general pattern of the long series of similar annual publications extending back to the formation of the association in Philadelphia in 1896. The volume contains a list of officers and directors, summary of proceedings, condensed technical program, president's annual address, officers' reports, minutes of executive board meetings, the second in a proposed series of foundation lectures, and transcript of 90 technical papers and committee reports with discussions. The book concludes with an index based on the subject matter, and a second index showing the list of authors of the papers.

1944 *Book of A.S.T.M. Standards,* Part I, Metals, cloth, 2047 pages, 6 x 9 inches, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia. Price $10.

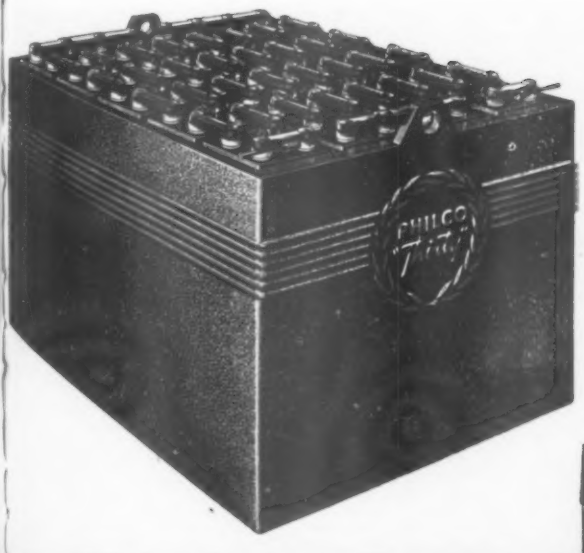
Normally a triennial publication, this volume, which is one of three containing standards and tentative standards of the American Society for Testing Materials, appears about a year early due to exhaustion of the previous edition. It contains 385 specifications and tests except those relating to chemical analysis which are published separately. Of those presented about 225 relate to ferrous metals The remainder apply to nonferrous metals and alloys. Specifications deal with both cast and wrought materials.

An innovation in this book is the inclusion of all emergency standards and emergency alternate provisions which have been used widely to expedite production and procurement of important materials. As in the previous edition two columns of type are used on a page to provide easier reading.



MORE THAN ever, today, Philco stands out as the leader in the development of modern high capacity, long-life storage batteries for electric industrial trucks. Well known to material handling men is the pioneering work of Philco with its famous XL and XVL type Batteries. And now, in addition, the great new Philco "Thirty" with 30% longer life, is available in increasing quantities for current deliveries. Powered by modern Philco Batteries, your electric trucks do more work. Philco dependability and longer life save you money. Write today for new descriptive catalogs. PHILCO CORPORATION, *Storage Battery Division,* Trenton 7, New Jersey.

For 50 years a Leader in Industrial Storage Battery Development



The New PHILCO "THIRTY"
with 30% longer life is identified by its distinctive red connectors.

Philco Motorized Hand-Lift Truck Battery

Typical Philco Electric Industrial Truck Battery in Steel Tray

No. 8 Mexican Graphite lowers chill depth and Brinell hardness, increases deflection and machinability

Photomicrograph from broken half of 1.25 inch arbitration bar of grey iron not treated with No. 8 Mexican Graphite. Cupola charge was made up of 48% steel, 33% cast scrap, 19% malleable pig iron and 45 lbs. of silicon briquettes. Total charge was 2544 lbs. This iron tested to the following physical properties:

Transverse Strength	2,497 lbs.	Total Chill Depth 41/32 in. (wedge bar)
Deflection	0.23 in.	Clear Chill Depth 26/32 in. (wedge bar)
Brinell Hardness	229	

Photomicrograph from broken half of arbitration bar of same base iron as above but treated with 1 lb. per ton of No. 8 Mexican Graphite. Holding time in ladle following addition of Graphite was less than 8 minutes. Note how the addition of No. 8 has destroyed the dendritic pattern and has given a normal flake pattern. The treated iron tested to the following physical properties:

Transverse Strength	2,907 lbs.	Total Chill Depth 13/32 in. (wedge bar)
Deflection	0.31 in.	Clear Chill Depth 10/32 in. (wedge bar)
Brinell Hardness	217	

As is clearly revealed in photomicrographs (see panel), the addition of 1 lb. of No. 8 Mexican Graphite per ton reduced chill depth and Brinell hardness, increased deflection and thereby improved machinability.

In every foundry where it is used, No. 8 Mexican Graphite produces similar improvements in finished castings. Machinability is greatly improved and the cost of metal control is lowered.

No. 8 Mexican Graphite is an especially prepared product, dustless and free of volatile matter. Packed in 100-lb. bags for easy handling, No. 8 Mexican Graphite effectively improves grey iron castings at a cost of less than 10c per ton.

If you are interested in treating your grey iron easily and at low cost, increasing machinability and obtaining a higher percentage of perfect castings, it will pay you to make ladle additions of No. 8 Mexican Graphite to your iron. Send us your casting problems and we will be happy to offer recommendations without obligation.

No. 8
Mexican Graphite

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

FRICTION SAWING IS

Old Process in Foundry Field

By H. J. CHAMBERLAND
Springfield, Mass.

FRICTION cutting is by no means a new process; old timers in foundries have been trimming gates and risers or removing other surplus material from castings in this manner for years. The fact remains that foundrymen knew how far they could go and to them it was still sawing and not friction cutting.

When speaking of friction cutting today, it is a matter of saw velocities from 3000 to 10,000 feet per minute. Until recently, no machine had sufficient rigidity to stand such speeds and no saw band could travel at a surface speed of more than two miles a minute under pressure of ½ inch material.

Experiments within the last two years have contributed to and greatly extended this method of cutting, but research engineers still are confronted with such factors as differences in conductibility of heat in various materials, application of high velocities in conjunction with wear and safety for sections over 1 inch and several other mechanical problems. However, at the present time, it is possible to friction cut materials from ⅛ inch to ½ inch very effectively.

Velocity Increases With Thickness

With high-speed equipment and of course a high-grade saw band, friction sawing may be performed at velocities from 3000 to 10,000 feet per minute. With friction sawing, the velocity increases with the thickness of material whereas with actual sawing it's vice versa. For example, chromium-vanadium steels ⅛-inch thick require a velocity of 4000 feet per minute but the velocity increases to 10,000 feet per minute for ½ inch material. On the other hand, brass can be sawed at high speed at 4000 feet per minute for ¼-inch stock with a necessary reduction to 3000 feet per minute for ½ inch. Incidentally, 1400 feet per minute would be the maximum velocity for ¼ inch brass stock if sawed in regular type machine.

For friction cutting, sufficient power behind the saw is imperative and a 5 horsepower motor should be used. Width of saw should be from ½ to 1 inch, depending on thickness of material. Contour type saws usually have a long life and reach the peak of efficiency after being used approximately ½-hour. The action which takes place in this case is that the friction of the saw on the material causes the metal in contact with the saw to soften and be carried out by the teeth.

Cuts obtained are uniform, reasonably straight and the burr beneath the cut is about ⅛ inch. Skin or surface hardness of the finished cut can hardly be detected on the superficial rockwell machine, and the effect of heat therefore is very negligible. Bands without teeth, also used for friction cutting, have an inferior cutting action and lack the advantage to remove chips quickly.

What is probably the most advanced step in saw band manufacturing is the recently developed buttress type. As readily seen in accompanying illustration, this saw has widely spaced teeth but not

Alloy steels as thick as ½ inch may be sawed efficiently with standard pitch precision contour saws operated at velocities of 9000 and 10,000 feet per minute. Cutting rates reach as high as 20 linear inches per minute

along lines of standard saw construction and so-called coarse pitch. With the new type saw less teeth contact the cut in a given time thus providing a substantial increase in chip clearance facilities.

The buttress saw band is particularly designed to accelerate the cutting of light alloys, sheet metal and the like. The saw has many other fields of applications such as the cutting of wood, wood products, plastics, synthetic rubber and many others. While designed for particularly high-speed cutting, it performs exceptionally well on any type or make of band-sawing machine capable to support the predetermined efficiency of the tool.

In conclusion, it should be mentioned that no attempt should be made at friction cutting without getting definite data from reliable sources regarding safe velocities applicable to respective conditions.

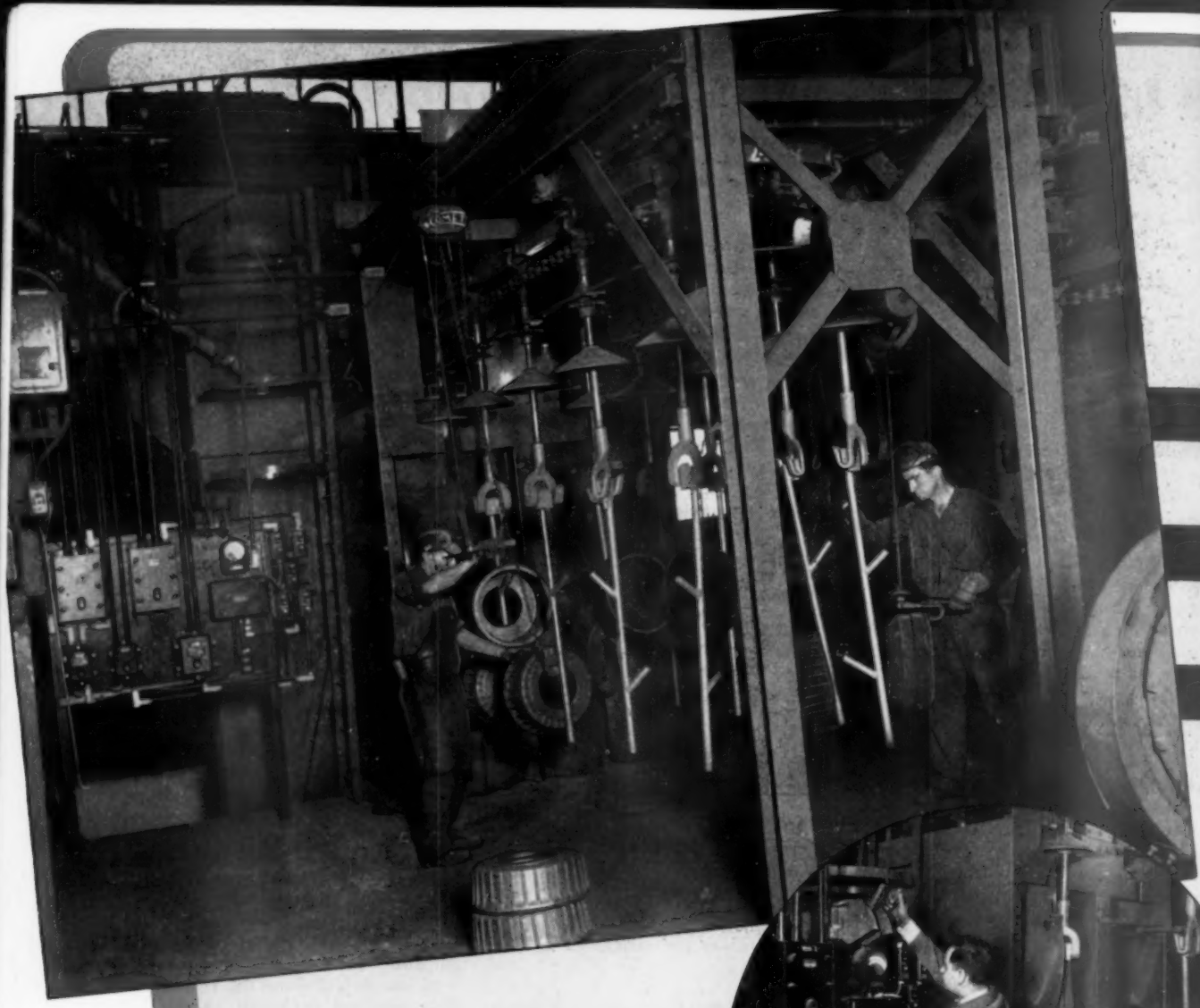
Light metals are sawed at velocities from 2500 to 4500 feet per minute with new type buttress saw band. Note coarse-pitch construction of saw

Describes Plans for Aiding Veterans

Aluminum Co. of America has printed in booklet form its detailed plan for re-employment and rehabilitation of returning war veterans. The program not only takes into consideration the terms of the National Selective Training and Service Act, but goes beyond its requirements with regard to re-employment. The plan also covers the return of veterans who, because of mental or physical disability, are unable to handle their former jobs. More than 26,000 Alcoa veterans are affected.

Preparing Films on Foundry Work

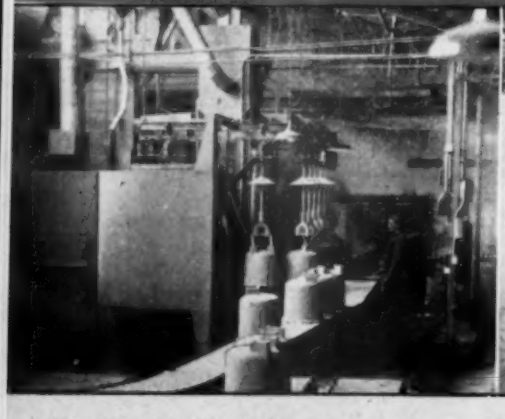
Office of Education, Washington, is preparing a series of films on foundry work which will show the various operations involved in bench molding, floor molding, machine molding, and cupola melting practice. Films are being produced by Atlas Educational Film Co., Oak Park, Ill., in co-operation with the Chicago Foundry Co. and Washburne Trade School, both in Chicago.



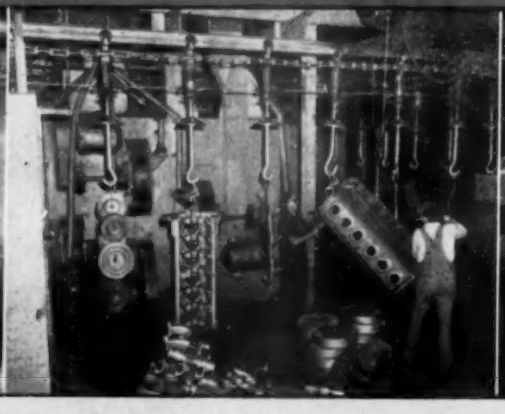
Above: Wheelabrator Monorail Cabinet installed at General Foundry and Mfg. Co., Flint, Mich., for cleaning truck brake drums.

At Right: Close up of electrical control panel on this machine.

EXAMPLES OF OTHER WHEELABRATO



Cleaning railroad air brake castings at New York Air Brake Co., Watertown, N. Y.



Spring City Foundry Co., Waukesha, Wis., uses this Wheelabrator Cabinet for cleaning cylinder blocks.

Cleaning Wright engine cylinder heads in Wheelabrator Cabinet prior to metallizi

Another Problem Solved by WHEELABRATING

PROBLEM To remove burned-in sand from 18" Meehanite truck brake drums averaging 100 lbs. each at General Foundry and Mfg. Co., Flint, Michigan.

FORMER RESULTS Tumbling mills cleaned only 14 castings in 50 min.

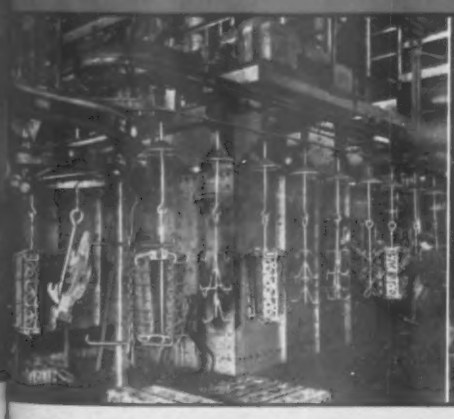
PRESENT RESULTS Wheelabrator Monorail Cabinet cleans 120 to 160 drums per hour.

The ability of *American* to engineer and design blast cleaning equipment that will meet production requirements and show an attractive profit on the investment is well known in the foundry industry. If you have a troublesome cleaning problem our engineers will be glad to give you the benefit of their experience and recommendations in solving it the practical way. We invite a discussion of your problems with them at any time.

THE FOUNDRY IS A GOOD PLACE TO WORK

American
FOUNDRY EQUIPMENT CO.
505 SOUTH BYRKIT STREET · MISHAWAKA, INDIANA

CABINETS USED IN THE FOUNDRY INDUSTRY



Wheelabrator Cabinet used by McKinnon Industries, for cleaning cylinder blocks.

Dayton Malleable Iron Co. cleans axle housings in this Wheelabrator Cabinet.

Axle and propellor shafts are Wheelabrated in this machine by a prominent motor manufacturer.

Around DETROIT

BY A. H. ALLEN
Detroit Editor, The Foundry

GM inspectors lay failure of foundries to meet all castings requirements to "insufficient control," but growth of captive foundries seen factor in jobbing plant situation

STRENGTHENING of relations between purchasing, inspection, engineering and follow-up departments of buyers of gray iron castings and their foundry sources is the keynote of recent discussions initiated here by the foundry committee of General Motors Corp. which was reactivated after a period of dormancy, at the urging of chief inspectors of three divisions of the corporation which are important users of gray iron castings—General Motors Truck, Detroit Transmission and Detroit Diesel.

The GM foundry committee met Feb. 20, with 36 in attendance, including foundry superintendents, metallurgists, process engineers, purchasing experts, inspectors and managers. Highlight of the day's sessions was a critical analysis of castings problems by the three inspectors mentioned above—H. J. Havermale of GMC Truck, S. A. Clapp of Detroit Transmission and A. A. Weidman of Detroit Diesel.

Points To Failure

Mr. Havermale reviewed gray iron castings requirements and then summarized, with the aid of charts, the failures of suppliers to meet these requirements. Briefly, requirements are, first, that castings should conform to chemical and hardness specifications; they should be free from chills, shrinks, blows and leaks; sections should conform to blueprint dimensions; castings should be properly cleaned of sand, fins, wires and rust where required; target locations should be held. He ascribed the failure of foundries to meet all these requirements to "insufficient control." To support this contention he showed charts covering specific defects in castings received from various foundries over a period of four months, from December through February.

Continuing the discussion, Mr. Clapp said inspectors were agreed foundry difficulties were overcome more quickly when there was close personal contact between the representatives of the foundry and the user. By this is meant that representatives of the foundry go to the user's plant and observe troubles at firsthand, and representatives of the user go to the foundry with samples and observe first hand what the foundry is doing to correct particular defects.

Mr. Weidman climaxed the three-part discussion by examining in detail some of the reasons which he saw for lack of proper control in foundries. He cited the usual arguments which are being directed toward foundries from many sources these days—lack of progressive management, over-age buildings, inadequate employe facilities, dirt, poor light, etc. But his most startling charge was that this insufficient control had cost his plant $755,649.78 for the year on just two of 377 different castings purchased by the plant. This figure covers scrap cost and machine labor required before foundry defects were discovered.

As corrective measures, he made 12 recommendations, all of which certainly would not apply to all foundries:

1. Periodically clean ceilings, structural steel, walls and floors, and paint them regularly.
2. Keep all equipment in good repair, such as cranes, hoists, conveyors, molds, inspection fixtures, etc.
3. Remove dirt and sand from floors and keep them at least partially clean.
4. Provide good lighting, both artificial and natural.
5. Install and maintain properly good toilets, showers, drinking fountains and locker rooms.
6. Enclose or put hoods on furnaces, and exhaust smoke and fumes outdoors.
7. Provide forced or circulating fresh air to furnace tenders.
8. Install ventilating fans.
9. Become acutely safety conscious.
10. Develop educational and training programs for employes, as well as supervision.
11. Initiate community promotional work, with emphasis upon the fact foundry work is not as bad as people really believe it to be.
12. Treat personnel as fellow human beings in the community and not as people to be shunned.

It could be realized the three inspectors did not deliberately set out to incriminate and malign the entire gray iron foundry industry. General Motors operates a number of its own gray iron foundries, and so the charges fall on them just as well as upon outside suppliers. The inspectors were merely reviewing the problem as they encountered it, and offering suggestions which their experience indicated to be sound.

Admittedly, much of what they charged is true, but there are many and most valid explanations which do not place the sole blame at the door of foundry managements. Thus, as E. C. Hoenicke, assistant general manager, Eaton Mfg. Co., explained to the committee, speaking for the gray iron jobbing foundries, much of the present trouble springs from trends which have been in the making for years, perhaps back to the early 20's when many of the larger automotive companies began to build their own or captive foundries to supply high-production requirements in cylinder blocks, heads, manifolds and other automotive castings. This meant a gradual but steady decline in the proportion of such business handled by jobbing foundries. The trend continued until at the time of Pearl Harbor the so-called captive foundries were producing at a rate of around 300,000 tons a month, against only 38,000 tons a month for the jobbing foundries.

Many Factors Involved

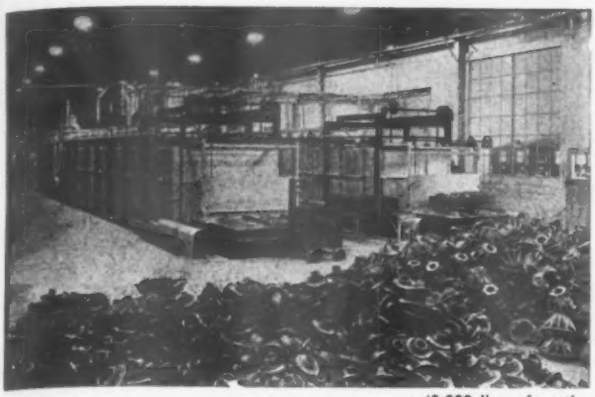
The steady reduction in jobbing foundry business had the natural result of intense competition for what tonnage was left and attendant ruinous price cutting. Finally, the depression of the 1930's dealt another blow which had jobbing foundries still staggering until the war in Europe started. At once the demand for machine tool castings spurted, but in general, the demand for gray iron and malleable castings for war goods languished because "it is a steel war," as the saying went. Restriction and suspension of output of peacetime goods removed these markets from the gray iron job shops, forcing them to reduce operations and see many of their skilled employes leave to assume war jobs where overtime would yield more money.

Freezing of prices already trimmed to the point of minimum, if any, profit return, had a further shackling effect on these foundries, as did rigid controls over materials such as pig iron, scrap, coke, etc. And finally, wage stabilization measures prevented the raising of some foundry wage levels comparatively much depressed.

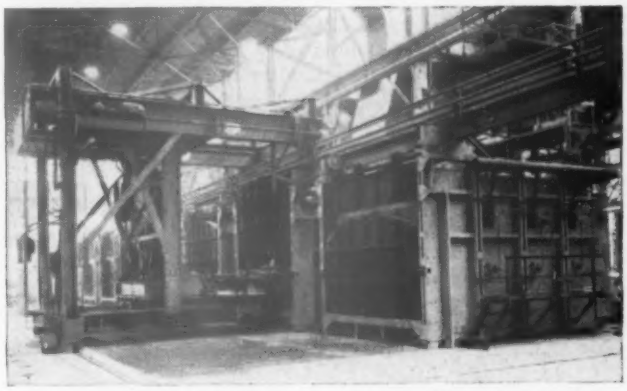
As the war progressed, Mr. Hoenicke explained, demand for automotive-type gray iron castings skyrocketed, and realization dawned it was not altogether a "steel" war. However, the large captive foundries had all been closed, throwing an inordinate load on the jobbing shops, which at best had capacity only one-tenth that of the captive shops.

"The combination of the big demand of the independent engine builders on jobbing foundries," he observed, "plus

(*Concluded on page* 130)



Scale Free Annealing Castings. 40,000 lbs. of castings per day are annealed absolutely scale-free in the above EF continuous special atmosphere short cycle annealing installation.



Heat Treating Large Castings. Heavy railroad castings, tank armor castings and other large parts and products are heated and quenched in EF units similar to above.

For Production Furnaces

For Handling Products in Any Size or Shape

FURNACES OIL, GAS or ELECTRIC

For Every Heating and Heat Treating Process

Aluminum Brazing
Annealing
Billet Heating
Bright Annealing
Bright Hardening
Copper Brazing
Controlled Atmosphere
Carburizing
Drawing
Enameling
Forging
Hardening
Malleablizing
Silver Soldering
Nitriding
Normalizing
Soaking Pits
Scale-Free Hardening
Quenching Machines
Ceramic Kilns, etc.
Process Heating

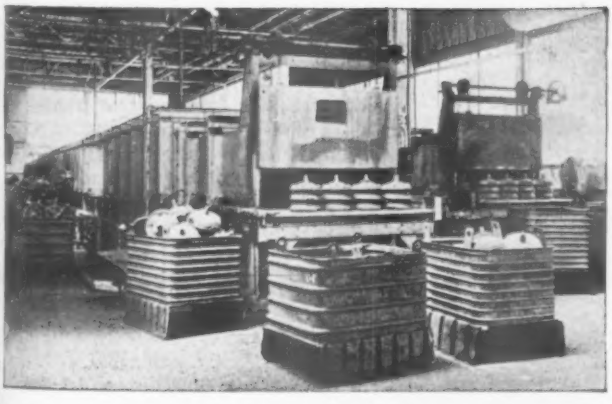
We Build the Furnace to Fit Your Job

THE ELECTRIC FURNACE CO.
SALEM, OHIO

For Production Furnaces, For Any Process or Production, Contact

The Electric Furnace Co. Phone 4661 Salem, Ohio

Our large and experienced engineering staff and ample manufacturing facilities enable us to make reasonably prompt deliveries. No job is too large or too unusual.



Annealing Large Castings—Continuously. Two EF oil fired furnaces annealing large alloy castings uniformly and continuously. The castings are carried through on roller hearths.

Car Bottom Furnaces. EF car type furnaces are built in any size, with single chambers, multiple chambers with cross transfer car, or with quenching means as required. May be gasfired, oilfired or electrically heated.

(*Concluded from page* 128)

the added load placed upon them by companies having captive foundries trying to buy their requirements on the outside due to their own foundries being closed or operating on low volume was . . . like taking a load off a giant and placing it on a pigmy to carry over a mountain."

Many other aspects of the problem have an important bearing on the question; for instance, the establishment of a fair selling price on a casting formerly made in a captive foundry whose costs are obviously not comparable with those of the jobbing foundry. Using captive foundry costs to set jobbing foundry selling prices has, even in the past, placed the latter supplier in a very difficult position. Again, there is the matter of setting standards of quality for castings purchased from jobbing foundries, often more rigorous than those imposed upon the captive foundry.

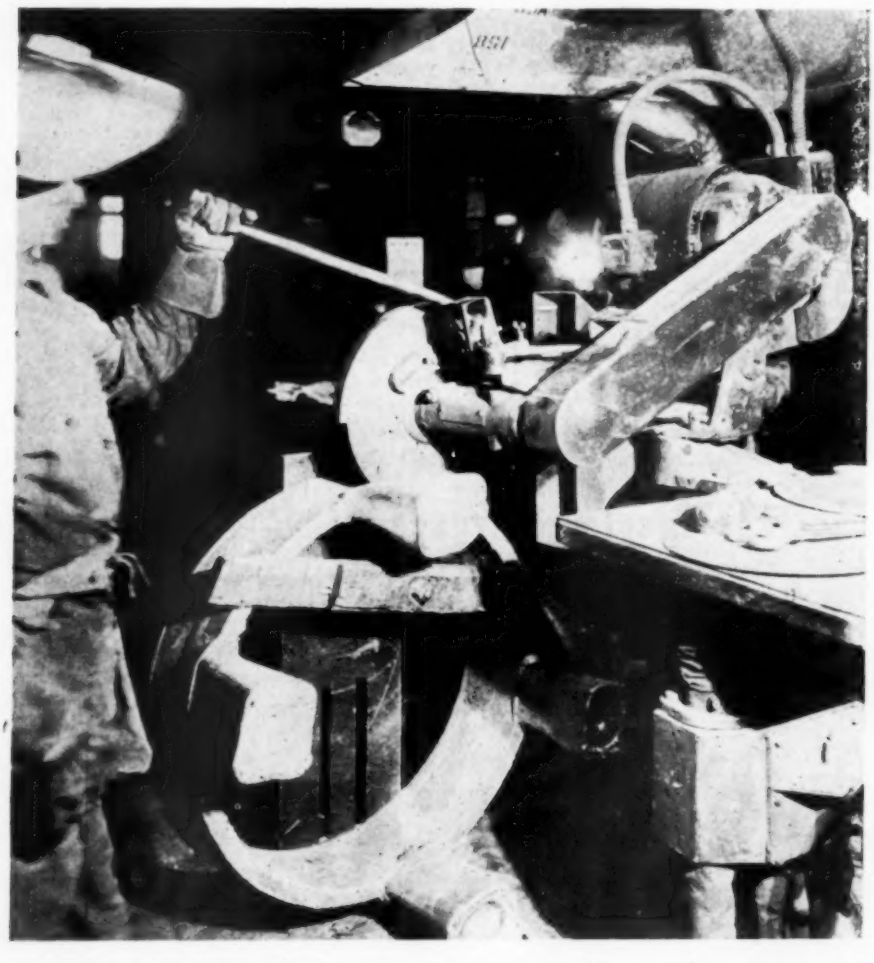
Mr. Hoenicke concurred with Mr. Clapp in the urgent need for more consultations between buyer and supplier, as well as co-operation between engineering, purchasing and manufacturing departments in the buyer's plant before a casting is released for production. Too often the first inkling an outside foundry has of what it is to make is when a blueprint or completed pattern is received. Then it is too late to start discussions of parting lines, uneven sections, dry sand cores and related problems.

Proper equipment also is of vital importance to production of good castings. Patterns, coreboxes, driers, etc., usually are furnished by the buyer and are purchased on a highly competitive basis, with the result pattern equipment furnished the foundry may be so poor or worn out that the foundry has to make its own new pattern equipment if it is to produce a sound casting. In comparison with the amount of money spent for machinery and tooling to finish the rough casting, the amount spent for patterns and pattern equipment which are vital to the production of the casting itself is trivial—an illogical situation.

The importance to foundrymen of the remarks made by the three General Motors chief inspectors was such that it was felt highly desirable to bring them to the attention of a larger segment of the foundry industry, so on March 15 they presented a repeat performance for the Detroit Chapter of the American Foundrymen's Association, with L. A. Danse of the GM production engineering staff acting as moderator. It was expected that many of the 250 in attendance might offer some suggestions on behalf of the foundry suppliers in the way of rebuttal, but only a few comments developed.

This is understandable, since many of the foundries represented are currently suppliers on General Motors business, and could be expected to show reticence in arguing the question of proper foundry control with "the customer." One thing made clear by Mr. Danse and his inspectors—and it is distinctly encouraging—was that the door to the inspection department is always open for foundries supplying castings, and that there will be no interference on this score by purchasing department officials. In fact, the urgent plea was made for more co-operation between foundrymen and engineering and inspection departments, to the end that better castings may be produced.

It is reportedly now the intention to put the comments of Messrs. Havermale, Clapp and Weidman into the form of a symposium which will be submitted to the national office of the American Foundrymen's Association for publication. This should be a constructive move, for the more widely this provocative subject is discussed, the better for all concerned.



SYNTHETIC RUBBER BOND: *Loss of our natural rubber supply as a source of material for bonding abrasive wheels, such as that shown here, has been countered by development of a special-purpose synthetic rubber bond, which has been reported by wheel manufacturers as more satisfactory than the natural rubber grade, according to the Hycar Chemical Co., Akron, O., producer of synthetic rubber from butadiene. Instances are cited of higher cutting rates and less wear for synthetic rubber bonded wheels in removing casting risers. (Photo courtesy John P. Kelly, brass and aluminum founder, Philadelphia)*

Forms New Malleable Advisory Committee

Formation of the Malleable Axle Housing Scheduling Industry Advisory Committee, Steel Division, WPB, has been announced. R. E. Valentine, chief of the division's Malleable Iron Section will be government presiding officer of the new group. Members include: Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; W. H. Moriarty, National Malleable & Steel Castings Co., Cleveland; James Smith, General Motors Corp., Danville, Ill.; F. W. Boynton, Standard Steel Spring Co., Madison, Ill.; George Veale, Eaton Axle Co., Cleveland; Vincent Gumbleton, Timken-Detroit Axle Co., Detroit; and L. D. Harkrider, General Malleable Corp., Waukesha, Wis.

Rehabilitation Plan

Caterpillar Tractor Co., Peoria 8, Ill., in a booklet recently published and entitled "Back on the Job," presents a step by step outline, pictorially illustrated, of how returning men and women from the armed forces are returned to their former jobs. Copies are available on request.

IT'S EASY TO FABRICATE

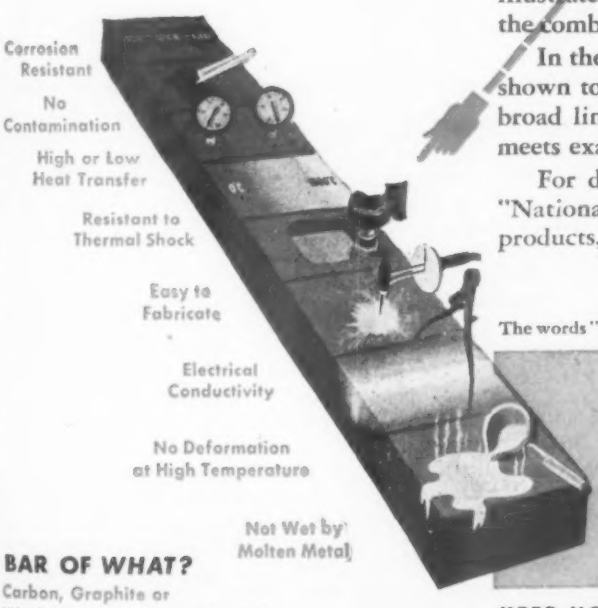
SINCE carbon and graphite and "Karbate" materials* are readily formed and machined into intricate shapes with precise dimensions, they are easily fabricated into equipment and structures of utmost utility for the metals, chemical, mechanical and other industries.

Examples are the injector-ejector, cooler-absorber, and five-way valve illustrated . . . each built of accurately finished pieces and each having the combination of properties for its job possessed by no other materials.

In the metals industries, applications run from the metallurgical tray shown to durable furnace linings easily built of fitted carbon blocks. A broad line of processing equipment—standardized or to your design—meets exacting demands of the chemical industries . . .

For detailed information on these and many other applications of "National" carbon and graphite and "Karbate" formed or fabricated products, write to our nearest division office for Catalog Section M-8000-A.

*Impervious carbon or graphite



BAR OF WHAT?
Carbon, Graphite or "Karbate" materials of course!

The words "National" and "Karbate" are registered trade-marks of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
General Offices: 30 East 42nd Street, New York 17, N. Y.
Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

KEEP YOUR EYE ON THE INFANTRY . . . THE DOUGHBOY DOES IT!

foundry DEVELOPMENTS

AT A PROMINENT ingot mold making plant the one piece cast iron core arbors are not pierced with vent holes in the usual manner. A number of ½-inch steel rods are placed upright against the arbor and about 6 inches apart. When the sand is rammed to the top, the rods are removed and wax vents are laid in the sand to connect the rod openings with openings in the arbor neck. The remainder of the sand then is rammed in place. Although the sand contains no artificial binder of any kind, the volume of gas flame escaping through the vent pipe on top of the arbor during the casting period is rather astonishing. The sand has a high permeability, about 300. Molds and cores are dried over night in a battery of ovens.

• • •

WHERE feeding through a riser or shrinkhead actually is essential, it has been found that a side riser, where conditions are favorable, is more efficient than one placed in the orthodox manner on top of the casting. In the past, one of the main objections to the side riser was the trouble, time and expense involved in removing it from the casting. This problem has been solved by connecting the riser to the casting by a number of small passages through a thin dry sand slab core. The connecting metal teats serve the anticipated purpose, and easily are removed in the cleaning room.

• • •

OCCASIONALLY a malleable casting is found which shows normal hardness, but breaks short under impact with a completely white fracture. When examined under the microscope, the structure indicates complete anneal with only ferrite and temper carbon present. Study of the abnormality leads to the opinion that it is caused by cooling too slowly in the subcritical range below 1300 degrees Fahr. which causes intergranular fragility. Restoration of normal properties can be accomplished by reheating to just under the critical range (about 1200 degrees) and quenching in water or oil.

• • •

ORDINARY water now can be transformed into the chemical equivalent of distilled water by a simple filtration process. Principle of filtration is utilization of melamine-derived and other resins developed by American Cyanamid Co., New York 20. Water is passed through beds of the ion exchange resins which transform the dissolved salts to corresponding acids and in turn absorb the acids. Final demineralized water has an average salts content as low as 2 parts per million as calcium carbonate, and has been produced as pure as one-half part per million. Process also is said to remove carbon dioxide from the water.

• • •

SEVERAL steel foundries have adopted the practice of making castings ranging in weight from a few pounds up to 10,000 pounds in air dried molds, instead of drying the molds in an oven. As with many other innovations the practice was adopted through force of circumstances, crowded conditions, production pressure and lack of oven space. The molds are made, headed and gated in the usual manner and then allowed to air dry for approximately 24 hours. The original moisture in the facing sand is 3.5 to 4 per cent. At the end of the drying period the face of the mold is almost as dry and hard as a mold baked in an oven. A typical facing sand batch contains 770 quarts silica sand, grain fineness 50 to 60 with 75 per cent retained on three sieves; 20 quarts bentonite; 8 quarts cereal binder; 6 quarts silica flour; 6 quarts silica clay. Physical properties of the mixture include: Green permeability 140; dry permeability 170 minimum; green strength compression 3 to 3.5 pounds; dry tensile strength 25 pounds per square inch minimum; sintering point 2450 degrees Fahr.

• • •

RECENT reference to an improved refractory lining material for converters and ladles leads to the conjecture that it might serve as well in small and other cupolas in which rammed linings are employed. Composition of the material is given as 50 per cent minus ⅜-inch silica ganister, 30 per cent minus ⅛-inch silica ganister, 14 per cent 140 mesh or finer silica flour, 6 per cent Western bentonite, and 7 per cent or more water by weight. The mixture is mulled for 8 minutes or more. Ramming is as hard as possible around the form. One difficulty that might be encountered is in proper drying since the directions for converter and ladle use are to dry at 600 degrees Fahr. as long as possible—up to 36 hours is desirable; heat slowly from 600 to 1250 degrees in 3 to 4 hours, and preheat from 1250 to 2000 degrees before charging with molten iron.

• • •

NEW transmission photometer for measuring accurately the amount of light transmitted through very small areas of spectrographic plates has been developed by General Electric Co. It consists of a light source, an optical system, a galvanometer, a light-sensitive cell, and a mechanical stage for accommodating the plate which can be moved in three directions. When measuring the light transmitted through a plate, the latter is mounted on the mechanical stage and light from a 6-volt, 18-ampere projection lamp in the optical system is collected by a condenser lens and focused on a wide aperture lens, producing an image of the condenser lens on the plate. Magnified by an objective lens, the image is cast on a rectangular diaphragm located in front of the light sensitive cell. Current output of the cell which is the degree of light transmitted through the field of the plate, is shown on the galvanometer scale.

• • •

BYPRODUCT of research by Society of Automotive Engineers transportation and maintenance activity in the field of wartime commercial vehicle maintenance is the possibility of utilizing aluminum brake drums. Preliminary reports indicate noise is obviated by inherent tendency of aluminum to vibrate outside the harmonics range, wear resistance is enhanced by metal-spraying the braking surface with iron compounds, and weight of the brake drum is reduced substantially.

E.B.

METALLURGICAL STUDY of enemy materiel as reported by Cady, Gillett and Grenell to the War Metallurgy Board makes some reference to castings. One is a cast steel crankshaft for a Mercedes Benz DB 601-E engine for aircraft. Containing 0.19 per cent carbon, 0.01 per cent phosphorus, 0.01 per cent sulphur, 0.21 per cent silicon, 0.52 per cent manganese, 1.61 per cent nickel, 1.78 per cent chromium, 0.15 per cent molybdenum, 0.15 per cent copper, and 0.03 per cent tin, the authors remark that it was a beautiful casting and that Charpy impact specimens from it gave 35 to 40 foot-pounds. Crankcase for the same type of engine, according to the authors, was a sound casting representing the highest state of the aluminum founder's art. It was made of an aluminum-silicon alloy with a carefully controlled addition of magnesium, and modified with sodium. Composition showed 9.5 per cent silicon, 0.20 per cent magnesium, 0.40 per cent iron, 0.03 per cent sodium. Tensile strength of a specimen cut from the casting showed 38,000 pounds per square inch, a yield strength of nearly 32,000 pounds per square inch, elongation of 3 per cent, and Vickers brinell of 94.

Volume Cleaning

With Extremely Low MAINTENANCE

SLY MASTER-BLAST

Three Sly Master Blast Units cleaning piston rings in the plant of the Muskegon Piston Ring Co., Sparta, Mich.

THIS Master Blast is ideal for the mass cleaning of castings that do not require the intensive blast of the Sly Centri-Blast.

It shoots a large volume of abrasive into the castings from the blower wheel powered by a 10 HP Motor. Its comparatively low pressure means less wear—less maintenance.

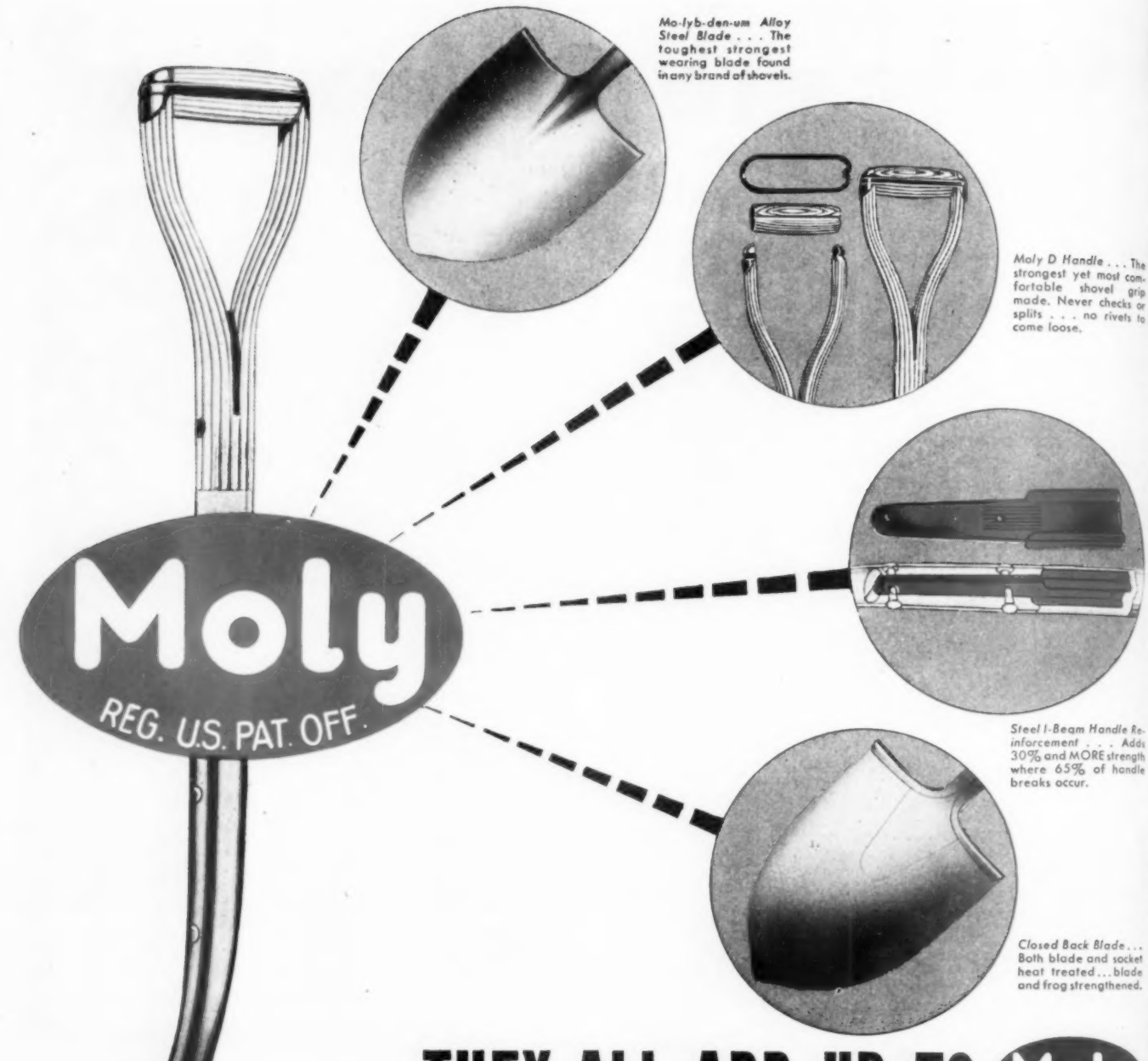
A spiral, between inner and outer shells, returns the abrasive—no elevators—no conveyors.

The simplest blast machine ever built—only 8 moving parts—equally sturdy, too. It yields big volume with very low maintenance. Ask for Bulletin S-77.

THE W. W. SLY MANUFACTURING CO. • Since 1874 • 4753 Train Ave., Cleveland 2, Ohio

SLY INDUSTRIAL DUST CONTROL

TUMBLING MILLS • BLAST CLEANING EQUIPMENT



Mo-lyb-den-um Alloy Steel Blade . . . The toughest strongest wearing blade found in any brand of shovels.

Moly D Handle . . . The strongest yet most comfortable shovel grip made. Never checks or splits . . . no rivets to come loose.

Steel I-Beam Handle Reinforcement . . . Adds 30% and MORE strength where 65% of handle breaks occur.

Closed Back Blade . . . Both blade and socket heat treated . . . blade and frog strengthened.

THEY ALL ADD UP TO Moly

REG. U.S. PAT. OFF.

The Finest Shovel Made

Moly shovels and scoops are all around better because each point of strain and wear is specially reinforced by an exclusive construction feature originated and developed by the Wood organization. Compare a Moly from end to end with any other shovel made and you'll find Moly markedly superior in ways that you can actually see.

Under normal conditions Moly shovels and scoops are available in the exact type and size required for the individual job. Get the habit now of specifying Moly when you buy shovels . . . because the name Moly on the order means final shovel costs which are lower.

THE WOOD SHOVEL AND TOOL COMPANY, PIQUA, OHIO

A National Organization *Specializing Exclusively* in Shovels, Spades and Scoops

MO-LYB-DEN-UM ALLOY SHOVELS

Precision Castings Discussed at CHICAGO CONFERENCE

By ERLE F. ROSS
Chicago Editor
THE FOUNDRY

SEVERAL hundred foundrymen of the Chicago district participated in three foundry panel sessions conducted at the Stevens hotel, March 29, as a part of the third annual Chicago War Production Conference sponsored by the 42 members of the Chicago Technical Societies Council in Co-operation with the Army, Navy and WPB. The conference had a registration of approximately 2500 to attend one or more of the 36 sessions held in the interest of facilitating production of vital war materials and products.

Of the three foundry panels, one was devoted to investment casting of high melting point alloys, and two were on magnesium castings. Discussion was lively in all, and worthwhile information and experience were exchanged freely. The investment castings panel was sponsored by the American Foundrymen's Association, while the magnesium panels were sponsored jointly by the A.F.A. and American Institute of Mining and Metallurgical Engineers.

Interest Developed Rapidly

Outstanding was the keen interest displayed in investment and precision castings which have developed so rapidly and played such an important part in war production. The subject was introduced by Capt. W. A. Morey and Capt. A. J. Dore of the Chicago Ordnance District, the former dealing with "Industrial Status of Precision Castings" and the latter with "Equipment Trends." It was made clear that both were expressing individual views and not the opinions of the Ordnance Department.

Capt. Morey warned that new processes often are exaggerated and precision casting certainly is not a cure for headaches in the foundry industry. "Investment" means a clothing or enveloping without parting. Thus, applied to metal casting, it is a process using an expendable pattern and a non-parting mold. Precision casting is a refinement of the investment process to a tolerance of 0.005-inch. In the dental profession, precision casting has long been known, and the use of vitalium gives an approach to steel melting temperatures.

Worth of the process depends upon accuracy of the pattern. In commercial practice, unlike dentistry, compensation for shrinkage can be provided by changing the die. Mold porosity is low and castings can be made at temperatures ranging from 400 to 2000 degrees Fahr.

The Air Corps probably was first to make use of precision casting, and without it there is doubt superchargers could have been produced in required volume. Ordnance work, according to Capt. Morey, involves use of S.A.E. and N.E. alloys, which are among the most difficult to cast. Of numerous precision cast parts made for ordnance, for example, several for the M-1 carbine, including the critical ejector, life expectancy has exceeded that of machined parts.

It was the speaker's opinion that precision casting at present should be considered an art rather than a science, although as experience is gained, it probably will become a science. Through its use stainless steel can be used in places otherwise not possible. Likewise, extremely hard alloys can be employed. Intricate magnets of alnico can be cast. Finishes ranging from 3 to 65 microinches can be produced, with the latter a normal. Precision castings show surprising resistance to wear, apparently due to some skin effect. Production castings thus far usually range in weight up to 3 pounds—as large as 10 pounds have been made but these have been special.

In conclusion, Capt. Morey said there are good, bad and indifferent vendors of precision castings, which behooves one to investigate and choose carefully in arranging for a source of supply. It was his judgment that the process likely will be grossly misapplied in the postwar period. Some of this misapplication can be avoided by not specifying precision castings where not needed and not calling for closer tolerances than are required. In many cases, they should be judged by comparing them as to performance and cost with parts made by machining methods.

Capt. Dore's contribution to the subject consisted of a series of slides illustrating types of equipment which have been developed or adapted to production of precision castings. An extensive exhibit of castings illustrated points covered by the two speakers.

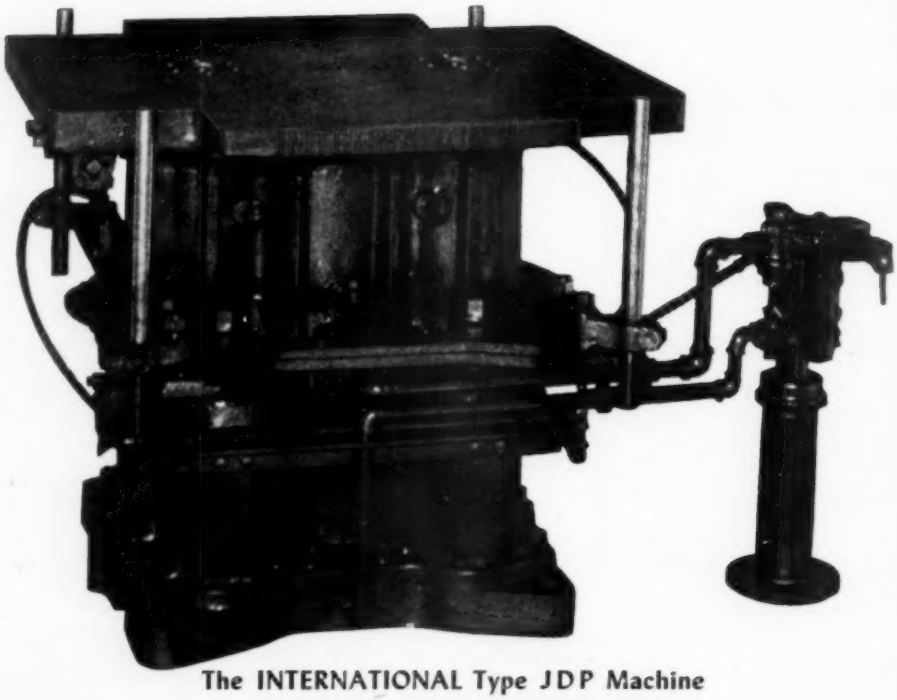
Substituting for Howard F. Taylor, Naval Research Laboratory, Washington, who was to have discussed "Gravity Head Investment Castings," Ensign D. A. Potter explained that work there thus far is only preliminary. Recently a 12-inch propeller screw weighing about 2½ pounds was cast from 12 per cent chromium alloy, and the next effort was an 18-inch torpedo screw weighing 12 pounds. It is too early to draw conclusion concerning the casting process.

However, Ensign Potter commented at some length on the importance of controlling metal temperature. The metal usually is cast at the lowest possible temperature, and it has been his experience that the optical pyrometer is not adequate for reading temperatures. He suggested attaching a quartz tube to the eyepiece to afford more accurate reading of the black body condition.

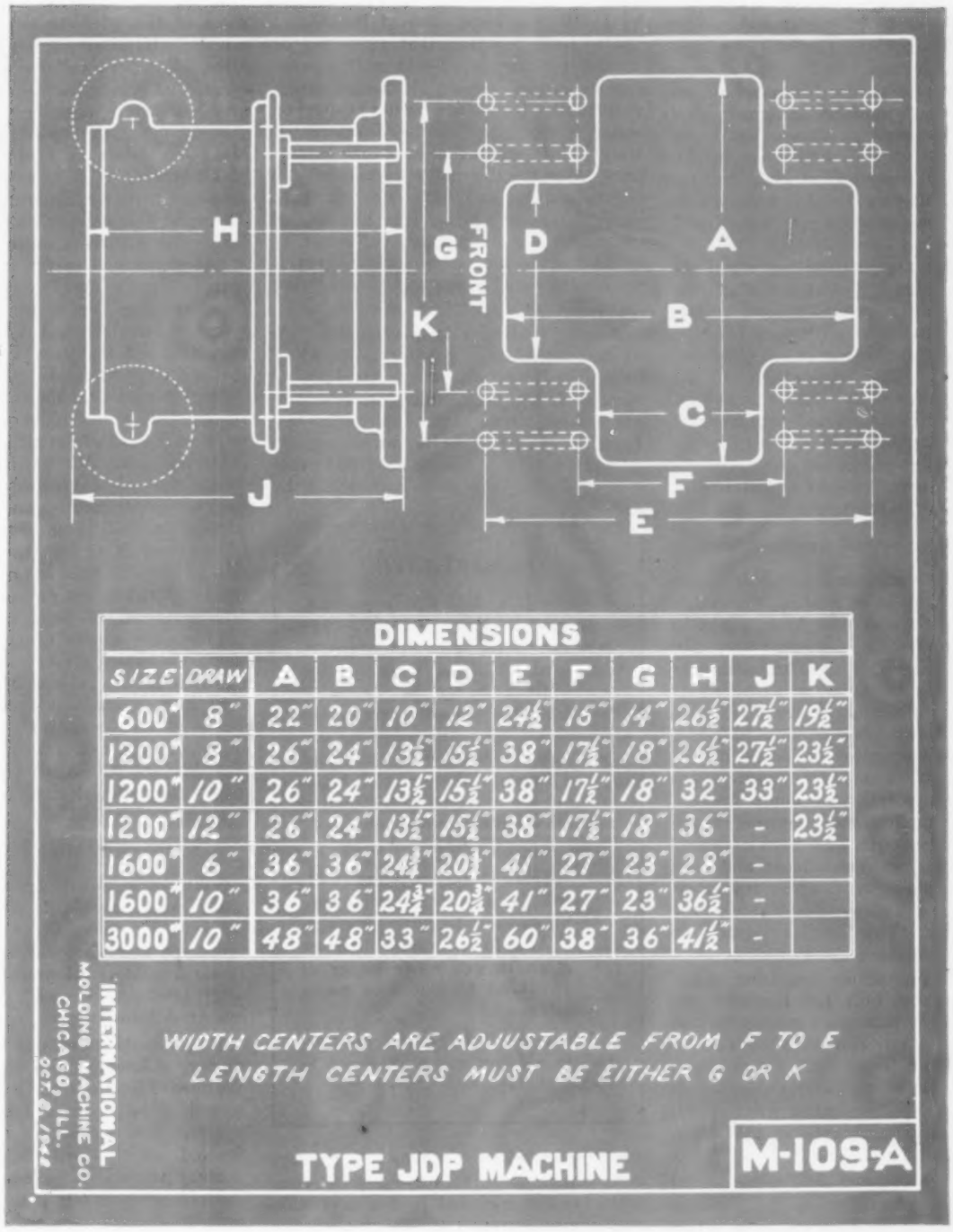
The first magnesium session provided three papers, as follows: "Comparison of Some American and European Cast Magnesium Alloys," by J. A. Davis, Battelle Memorial Institute, Columbus, O.; "Properties and Characteristics of Common Magnesium Casting Alloys," by J. D. Hanawalt, C. E. Nelson and R. S. Busk, Dow Chemical Co., Midland, Mich.; and "Heat Treatment of 6 Per Cent Aluminum—3 Per Cent Zinc Magnesium Alloys," by Dr. R. F. Thomson,

(*Concluded on page* 138)

NAVY CASTINGS: *Showing castings being poured in the foundry department aboard a Navy repair ship. (Official U. S. Navy photograph)*



The INTERNATIONAL Type JDP Machine has the Exclusive DOUBLE JOLT Feature. Manufactured for foundries.



DIMENSIONS

SIZE	DRAW	A	B	C	D	E	F	G	H	J	K
600#	8"	22"	20"	10"	12"	24½"	15"	14"	26½"	27½"	19½"
1200#	8"	26"	24"	13½"	15½"	38"	17½"	18"	26½"	27½"	23½"
1200#	10"	26"	24"	13½"	15½"	38"	17½"	18"	32"	33"	23½"
1200#	12"	26"	24"	13½"	15½"	38"	17½"	18"	36"	-	23½"
1600#	6"	36"	36"	24¾"	20¾"	41"	27"	23"	28"	-	
1600#	10"	36"	36"	24¾"	20¾"	41"	27"	23"	36½"	-	
3000#	10"	48"	48"	33"	26½"	60"	38"	36"	41½"	-	

INTERNATIONAL MOLDING MACHINE CO. CHICAGO, ILL. OCT. 6, 1944

WIDTH CENTERS ARE ADJUSTABLE FROM F TO E
LENGTH CENTERS MUST BE EITHER G OR K

TYPE JDP MACHINE **M-109-A**

INTERNATIONAL TYPE JDP MACHINE

This machine is adaptable to a large range of work suitable to the pin lift style. It is readily adjustable.

The EXCLUSIVE FEATURE of this Type JDP Machine is its **positive jolt** and **true ram.** This action is accomplished by the use of TWO JOLT SECTIONS, combined in one integral part.

The incorporation of this method combined with the sturdiness of the machine gives a **positive ram** throughout the mold.

The lifting section is guided by hardened steel parts for long lasting wear. All valves are conveniently located for ease of operation. All wearing parts can be readily replaced.

INTERNATIONAL MOLDING MACHINE COMPANY
2608 WEST 16TH STREET • CHICAGO 8, ILLINOIS

(Concluded from page 135)

Dodge Chicago Plant, Division of Chrysler Corp., Chicago.

After presenting detailed comparisons of the more prominent American and European magnesium alloys, Mr. Davis ventured the conclusion that we in this country will eventually abandon the higher zinc alloys in favor of some others already in use, or some yet to be developed.

Mr. Nelson summarized that all of the common casting alloys are essentially of one family—Mg-Al-Mn-Zn—and, therefore, their properties are interdependent. Since service requirements are different, no one composition will satisfy all the needs. In view of this fact and importance to both foundry and fabricator of keeping the number of different alloys to a reasonable minimum, three compositions have been selected as suitable for most service requirements.

Describes Several Compositions

Since the mechanical properties seem to be substantially equivalent, the choice between high and low zinc alloys is based upon other characteristics, Mr. Nelson continued. Future research may show alloy differences in response to treatments, or in other mechanical properties which will affect serviceability and may, therefore, outweigh some of the qualitative or economic considerations leading to the following compositions:

1. For applications requiring maximum yield strength and hardness, only fair toughness, good soundness, and good salt atmosphere corrosion resistance, Dowmetal C alloy (Mg-9Al-Mn-2Zn) is indicated. This applies equally to sand and permanent mold castings.

2. For applications requiring maximum toughness, only fair hardness and yield strength, maximum soundness and weldability, a low zinc alloy with aluminum less than 9 per cent, for example, Dowmetal A alloy (Mg-8Al-Mn-Zn) is indicated. For maximum salt atmosphere corrosion resistance in this alloy, purity must be controlled. This applies equally to sand and permanent mold castings.

3. For general sand casting applications requiring maximum toughness, only fair hardness and yield strength, maximum salt atmosphere corrosion resistance and tolerance to impurities, Dowmetal H alloy (Mg-6Al-3Zn-Mn) is indicated.

In conclusion, Mr. Nelson asserted the benefits of present alloy composition factors can be completely attained only after the best design and fabricating practices have been sought out and fully applied.

The second magnesium panel carried a common theme with the following papers: "Effect of Gas on the Properties of Magnesium Sand Casting Alloys," by R. S. Busk, Dow Chemical Co., Midland, Mich.; "Reduction of Microporosity in Magnesium Alloy Castings," by J. C. De Haven, Battelle Memorial Institute, Columbus, O.; and "Grain Refinement of Magnesium Casting Alloys," by L. W. Eastwood, also of Battelle.

Mr. Busk reported that hydrogen or natural gas introduced into molten magnesium causes porosity, hydrogen being particularly bad when water vapor or water is present. Thorough drying of scrap before melting reduces gas formation. Allowing the molten metal to stand before pouring and sometimes changing mold design is beneficial in eliminating gas. But a more positive procedure is to bubble helium or chlorine through the molten metal in the crucible, chlorine being the more practical practice.

Atomic hydrogen is particularly bad in causing castings porosity, according to Mr. De Haven who was in good agreement with Mr. Busk. Moisture from the atmosphere, from sand, from flux, and from tools must be guarded against religiously. He recommended the practice of fluxing the melt with the bubbling of chlorine. Commercial castings made from metal so treated show considerable improvement over those made from untreated metal. Stirring of the metal during chlorine introduction is not necessary, cleansing action being sufficient without it.

Mr. Eastwood reviewed the practice of melting, refining, fluxing and superheating of magnesium, and stated that holding the metal at 1700 degrees Fahr. causes grain growth. Good grain refinement can be obtained by treating the metal with natural gas, but little benefit is derived after a 6-minute period. Furthermore, some other forms of carbonaceous treatment can be employed. A good practice is to combine gassing and grain refinement by passing carbon tetrachloride and chlorine through the metal together. Large batches can be handled in this way.

Discussion of the various papers brought out the fact that porosity and tensile strength of magnesium castings vary with the weather. One investigator of this problem developed a correlation with absolute, not relative, humidity. However, experts were in agreement that the chlorine treatment will give uniformity regardless of weather.

Speaking at the conference luncheon, Maj. Gen. Levin H. Campbell Jr., chief of Ordnance, U. S. Army, Washington, speaking on "Building Firepower Through Technology," was profuse in his commendation of industry for the job it had performed in the manufacture of ordnance. Private enterprise and the overwhelming "know how" of Yankee industry have blasted German aggression, planned and subsidized since Bismarck's day, he said.

Of interest was the General's statement that the Ordnance Department requires 300,000 different items, of which 2000 are complete units. Since July, 1940, the department has spent $46 billion for ordnance, and included in production has been 75,000 tanks, 37 billion rounds of small arms ammunition, 4,000,000 tons of bombs, 770,000 trucks, 130,000 self-propelled guns and 55,000 pieces of field artillery.

"Time is our most valuable commodity now," General Campbell asserted. "Our technical aptitude has been developed not by government action, but by United States initiative, and our speed in turning out better weapons has upset the enemy. Germany is suffering the most complete destruction ever dealt a modern industrial nation.

Research Must Continue

"We must keep American industry ready to shift rapidly to war production," he warned. "Design of weapons and firepower is in no way static, and our research and development must go on after resistance ceases. It is a costly but vital insurance."

As principal speaker at the conference dinner, Clarence G. Stoll, president, Western Electric Co., New York, presented a battle-front report based on a front line inspection trip where he studied effectiveness of American industrial production. He pointed out that the objective of our high command has been to conserve human life by providing adequate equipment and material. In making this possible, industry can justly be proud of its performance, but he warned that the task in the Pacific will be more arduous than that in Europe because of the greater distances involved. To transport men and materials, depending upon the starting point, will require from two to four times the time, or two to four times the number of ships.

Another obstacle Mr. Stoll mentioned was that in the Pacific we have no loyal friends with industrial and storage facilities such as we had in England, France and Belgium. He illustrated this point by saying the Nazis in Paris alone damaged 800 locomotives by placing explosive charges in cabs and one cylinder. In one month shops in France and Belgium reconditioned 2000 locomotives for service.

IMPORTANT!

Paper is a No. 1 war material shortage—because over 700,000 different WAR items are wrapped, packaged, labelled, tagged, or made from paper or container board. And the Pacific war, when it speeds up, will require stupendous amounts of paper and board because double and triple packing are required for protection against weather, insects, etc.

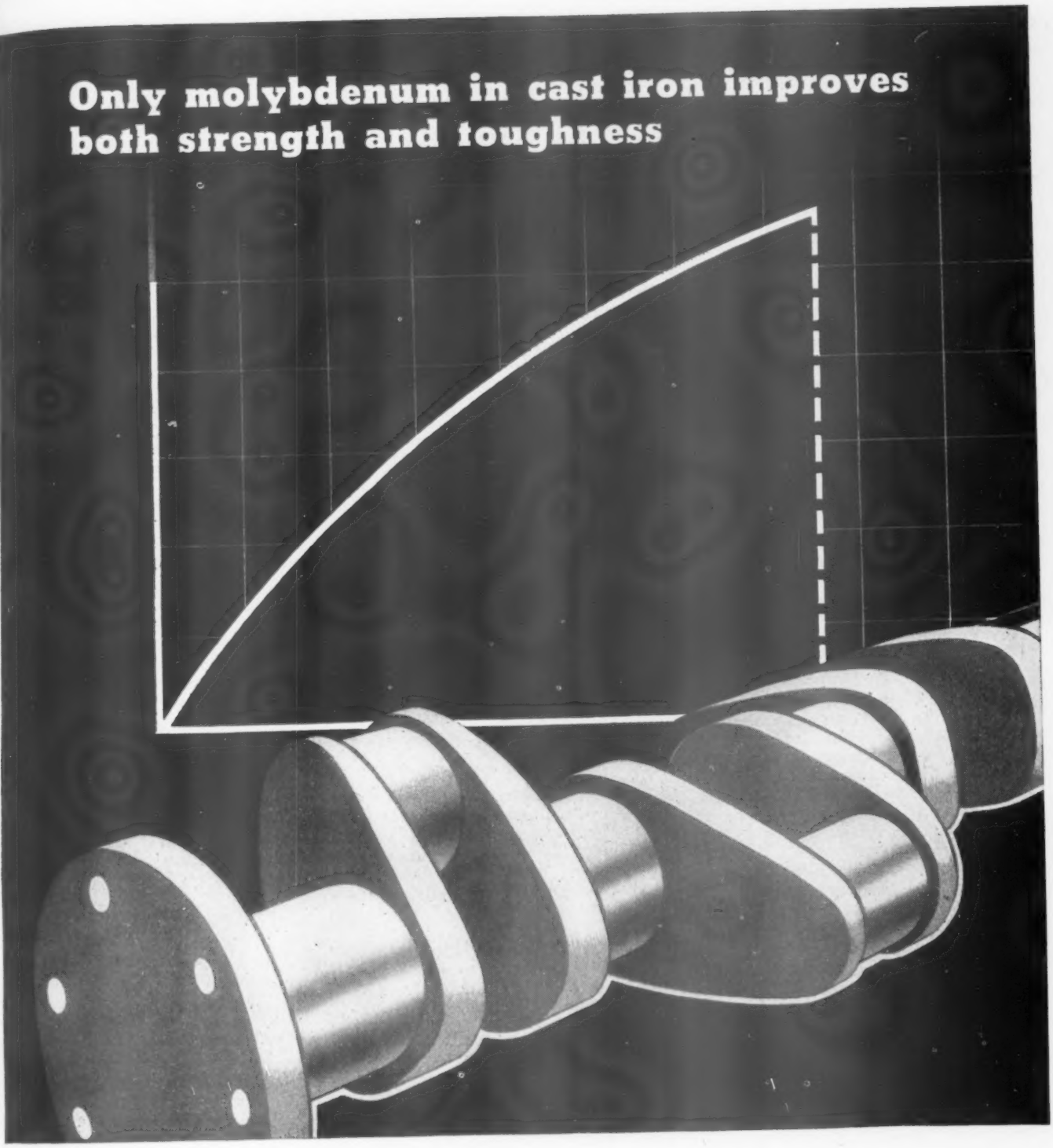
So please—

Share this magazine with friends, since fewer copies are printed due to paper shortage;

And look over your store room to get waste paper of any kind to put into paper salvage.

Then you'll be doing an "extra" to aid the war effort—and to speed victory.

Only molybdenum in cast iron improves both strength and toughness



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

500 Fifth Avenue · New York City

MOLY

Industry BRIEFS

BALTIMORE Foundry & Machine Corp., Charles and Wells streets, Baltimore, will transfer to its local plant, recently enlarged, the equipment of the Harrison Bolt & Nut Co., Harrison, N. J., and the Aetna Forge & Rivet Co., Pittsburgh. Trade names of these two companies are to be retained. The Baltimore company, until last fall when it was acquired by the McConway & Torley Corp., Pittsburgh, was known as the Kennedy Foundry Co.

• • •

Earl T. Luff and Glenn K. Deeter have purchased the White Foundry Co., Kansas City, Mo., previously owned by V. L. Taylor and A. D. White. Equipped for the manufacture of aluminum and gray iron castings, the plant will reopen under the supervision of Mr. White.

• • •

Lee W. Fluss and Charles W. Cox, owners of the Fox Foundry, Decatur, Ill., have closed the foundry there and plan to install their equipment in larger quarters recently purchased in the Ashmore Foundry building, Hillsboro, Ill. The new location is a brick foundry 64 x 84 feet, with a side extension 28 × 56 feet.

• • •

Machine tool shipments during February by 198 companies amounted to $36,018,000, a decrease of 3.6 per cent from January, according to WPB. The daily rate was up 6.8 per cent. Net new orders of $58,024,000 were 1 per cent ahead of January, while unfilled orders of $303,445,000 showed a 7.9 per cent gain.

• • •

Shipments of brass and bronze ingots in February amounted to 39,297 tons, against 41,021 tons in January, according to the Defense Council of the Ingot Brass and Bronze Industry. This accounts for more than 95 per cent of the industry's total deliveries.

• • •

Foundry equipment orders placed in February represented 465.3 per cent of the 1937-1939 monthly average, compared with 422.4 per cent in January and 456.8 in February, 1944, according to the Foundry Equipment Manufacturers Association. New equipment orders were the largest in 4 months.

• • •

Joseph O. Danko, owner of the Danko Pattern & Mfg. Co., 31-37 East Lee street, Baltimore, maker of wood and metal patterns, plans the erection of an aluminum foundry at 4810 East Wabash avenue, Arlington. It is understood that the foundry will be operated independently under a name yet to be announced.

• • •

Youngstown Miller Co. Inc., formerly of Sandusky, O., manufacturer of plastic coaters and oil reclaimers, has been acquired by Walter Kidde & Co. Inc., Belleville, N. J. John F. Kidde is president of the new subsidiary company and F. L. Gerin has been appointed vice president and general manager. The main office of Youngstown Miller Co. will be located at 675 Main street, Belleville, N. J.

• • •

Surface Combustion, Toledo, O., has been awarded the Army-Navy "E" in recognition of outstanding development and production of heat treating furnaces for production line methods on essential war materials. The design, building and installing of gas-fired heat treating furnaces for production of high explosive shells in particular was cited.

• • •

American Foundry Equipment Co., Mishawaka, Ind., has been awarded the third white star to be added to its Army-Navy "E" production award flag for continued outstanding achievement in producing materials essential to the war effort.

• • •

Hamilton Foundry & Machine Co., Hamilton, O., has been granted a third renewal of the Army-Navy "E" Award in recognition of continued outstanding production.

• • •

Center Pattern Works Inc., 1036 Dime building, Detroit, has been incorporated with $10,000 capital to manufacture metal and wood patterns, by Arthur T. Perris, 4623 Third street.

• • •

American Steel Foundries, Chicago, has been authorized by Defense Plant Corp. a $3,000,000 increase in contract to provide additional equipment at a plant in Chicago, making overall commitment $29,000,000.

• • •

Cooper Alloy Foundry Co., Hillside, N. J., has been authorized by Defense Plant Corp. a $35,000 increase in contract to provide additional equipment at a plant at Hillside, making overall commitment $400,000.

• • •

Small Steel Castings Inc., Buffalo, has been incorporated with $75,000 capital by Joseph and Marion Cheney and George M. Nelson, of Buffalo, and Joseph Spriesch of Springville, N. Y.

• • •

Building permit has been issued for construction of an addition to the foundry building of Frank Casalicchio, 2459 East Fifty-eighth street, Los Angeles, to cover an area of 50 x 110 feet and to cost approximately $14,830.

• • •

All stock, fixtures, equipment, contracts and the right to use the name of the Independent Foundry Supply Co., at 2325 East Thirty-eighth street, Vernon, Calif., were sold on March 31 by Steven and Blanche P. Mocsny to Carl D. Jackson, J. Howland Paddock and John Rowe as co-partners.

• • •

Building permit has been issued for construction of a warehouse building at 9901 South Alameda street, Los Angeles, for the Finkelstein Foundry Supply Co., to cover an area of 80 x 100 feet and to cost $10,000.

• • •

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has changed the name of its former Radio Division to the Industrial Electronics Division, with C. J. Burnside, for the past 3 years manager of the former, continuing in charge.

• • •

Alexander Milburn Co., Baltimore, since 1907 manufacturers of gas cutting, welding and spray gun apparatus, has been taken over by the newly organized Black Mfg. Co. S. Duncan Black Jr. is president of the new company.

• • •

Flynn & Emerich Co., Grantley and Western Maryland railroad, Baltimore, will build a core room extension 45 x 65 x 80 feet. Plans are being made for further expansion later.

• • •

Lamont Alloy Foundry Ltd., 4 Alice street, Joliette, Que., is having plans prepared for construction of a plant to cost about $40,000.

• • •

Dean-Wallace Foundry is the firm name under which Dorwin Dean and John Wallace have published a certificate that they are conducting business at 228 South Kenwood avenue, Glendale, Calif.

• • •

W. & W. Foundry is the firm name under which Miles F. Wright, Donald M. Walker and Frank Pellegrino have published a certificate that they are conducting business at 11688 Atlantic boulevard, Lynwood, Calif.

• • •

Elyria Brass & Bronze Co., 836 Walnut street, Elyria, O., is building a one-story 14 x 68-foot plant addition.

• • •

The name of Detroit Brass Foundry, 5142 Alhambra avenue, Los Angeles, has been changed to Los Angeles Brass Co., manufacturing under the trademark name "L. A. Brass." Original facilities of the 12-year old concern have been more than doubled with addition of new

(*Concluded on page* 142)

KRAUSE

Truscor (Light Weight) AND Amerikor (Heavy Weight)

CEREAL BINDERS

Perfect Cores Get Their Start Here

No one knows better than you how important it is to get the right formula for your core mix. Equally important to you, however, is *our* formula for making Truscor and Amerikor Cereal Binders — what parts of the corn to use . . . the tempering . . . the processing . . . the scientific control at every step of the way.

The results are cereal binders of uniform quality which develops uniform strength . . . greater permeability . . . quicker mix . . . better decomposition — and better, more accurate castings of higher quality. On your next order for cereal binders, specify Krause Truscor or Amerikor from one of the distributors listed below.

2,000,000 lbs. of corn per day are carried by conveyor in the processing of Truscor and Amerikor Cereal Binders.

DISTRIBUTORS

M. A. Bell Co., St. Louis 2, Mo.
A. L. Cavedo & Son, Inc., Richmond 21, Va.
Foundries Materials Co., Hammond, Ind.
Foundry Supplies Co., Chicago 16, Ill.
J. H. Hatten, Lansdowne, Pa.
Independent Foundry Supply Co., Los Angeles 11, Calif.
Marthens & Co., Moline, Ill.
Carl F. Miller & Co., Seattle 4, Wash.
Miller & Zehrung Chemical Co., Portland 9, Oregon
Milwaukee Chaplet & Mfg. Co., Milwaukee 4, Wis.
Pacific Graphite Works, Oakland 8, Calif.
Porter-Warner, Chattanooga 2, Tenn.
Smith-Sharpe Co., Minneapolis 14, Minn.
Frederic B. Stevens, Inc., Buffalo 12, N. Y.
Frederic B. Stevens, Inc., Cleveland 14, Ohio
Frederic B. Stevens, Inc., Detroit 26, Mich.

Quicker Mix! Blends with All Binders!

Greater Green Strength! No Sag!

Better Flowability! Uniform Ramming!

No Sticking! Increased Production!

Better Permeability! Less Scabbing, Cold Shut, Buckling!

Quicker Shake-Out Saves Time!

CHAS. A. KRAUSE MILLING CO.

South 43rd and West Burnham Streets — MILWAUKEE 1, WISCONSIN

★ WORLD'S LARGEST DRY CORN MILLERS

(*Concluded from page 140*)

equipment and a complete machine shop. Three new buildings have been added.

• • •

United Bronze Corp., 1753 Penobscot Building, Detroit, has been incorporated with $100,000 capital to operate a foundry and general manufacturing business, by Harold V. Raymond, same address.

• • •

Holden Castings Corp., 607 Ann street, St. Joseph, Mich., has been incorporated with 50,000 shares no par value to manufacture metal castings, tools, machinery and equipment, by Walter E. Pearson, 810 Broad street, St. Joseph.

• • •

Dominion Wheel & Foundries Ltd., 171 Eastern avenue, Toronto, Ont., is having plans prepared by James Proctor & Redfern Ltd., 36 Toronto street, for a plant addition, estimated to cost with equipment about $50,000.

• • •

Dominion Brass & Aluminum Foundry, 5244 Casgrain street, Ville St. Pierre, Que., plans construction of a foundry on Milton street, estimated to cost with equipment about $50,000.

• • •

Permission has been granted to T. J. O'Hara by the board of supervisors to operate a foundry at 2426 East 55th street, Huntington Park, Calif.

Establishes Safety Research Branch

Pyrene Development Corp., Newark, N. J., has been formed as a subsidiary of Pyrene Mfg. Co., that city, as an industrial research and development organization which will carry out research on fire extinguishing equipment and compounds and work in the larger field of safety devices. Officers of the new organization are: President, Charles G. Durfee; vice president, Edward J. Waring; secretary and treasurer, Edward A. Clapp.

Observes Fiftieth Anniversary

George Rahmann & Co. Inc., New York, manufacturer of belting and leather products, this year is observing the fiftieth anniversary of its founding. An informal dinner in celebration of the occasion was held April 12 at the Hotel McAlpin, New York.

Forms New Division

United States Vanadium Corp., a unit of Union Carbide & Carbon Corp., has formed a Metal Chemicals Division, which will manufacture and market inorganic compounds of tungsten, molybdenum, vanadium and other metals. J. A. Holladay has been elected a vice president of the company in charge of the new division, with headquarters at 30 East 42nd street, New York.

OBITUARY

PERCY PRITCHARD, 52, deputy chairman and joint managing director of Birmid Industries Ltd., Smethwick, England, died Feb. 2, at Birmingham. A leading figure in the British foundry world, Mr. Pritchard was president of the British Cast Iron Research Association and a member of the British Nonferrous Metals Research Association, the British Institute of Foundrymen, and the Institute of Metals. At the outbreak of the war he became director of the Light Alloy Control (Castings). Mr. Pritchard's early association with the foundry industry was in 1914 when, with Arnold Pearce, he started a small iron foundry to manufacture motorcycle cylinders.

PERCY PRITCHARD

♦ ♦ ♦

Theodore Fredrich, 58, production manager, Production Pattern Co., Milwaukee, died March 17 in that city. A native of Milwaukee, Mr. Fredrich was secretary-treasurer of the pattern company for many years and became production manager a year and a half ago. He was a member of the American Foundrymen's Association.

♦ ♦ ♦

Walter E. Miller, 80, a former vice president, treasurer and director, Fairbanks, Morse & Co., Chicago, and a director of Canadian Fairbanks-Morse Co. Ltd., Montreal, died April 3 in Chicago. He had retired in 1929 after 42 years' service with the company.

♦ ♦ ♦

Leroy F. Johnson, 53, for the past 10 years Chicago district sales manager of the Vanadium Corp. of America, died March 9, at Elmhurst, Ill.

♦ ♦ ♦

Orville T. Hagaman, foundry superintendent of the Acme Foundry & Machine Co., Coffeyville, Kans., died March 13, in that city.

♦ ♦ ♦

Frank F. Ellis, 86, operator of the Avondale Stove & Foundry Co., Birmingham, Ala., until his retirement several years ago, died March 21 in that city.

♦ ♦ ♦

Arthur J. Dunn, vice president and sales manager of the Chase Foundry & Mfg. Co., Columbus, O., until his retirement in 1936, died March 28 in that city. Prior to joining Chase Foundry in 1916 he had been associated with Kilbourne & Jacobs Mfg. Co.

♦ ♦ ♦

Leslie M. Hansen, 55, president, Industrial Silica Corp., Chicago, died March 18 in Barrington, Ill. A native of Michigan, he graduated as a chemical engineer from the University of Pennsylvania in 1913. After working as an engineer for the Santa Fe railroad and for steel foundries in Iowa, he went to Chicago in 1922 as secretary of Frank D. Chase Inc. Mr. Hansen was president of the National Industrial Sand Association in 1941.

♦ ♦ ♦

Peter Hott, 85, widely known in the foundry industry for many years, died March 18 in Milwaukee. A native of Germany, Mr. Hott went to Milwaukee in 1881. Before his retirement in 1913 he worked as superintendent at Filer & Stowell Co., and Bailey Bros. Co., and for some years conducted his own business, the Milwaukee Iron Works. He was a member of the Wisconsin Chapter of the American Foundrymen's Association.

♦ ♦ ♦

Bernard F. Metz, chief accountant at Grede Foundries Inc., Milwaukee, for the past 9 years, died April 6, in that city.

♦ ♦ ♦

Harry L. Chisholm, retired secretary, Atlas Steel Casting Co., Buffalo, died recently in that city.

Book Review

The Foreman in Labor Relations; The Unionization of Foremen; Practical Techniques of Collective Bargaining; paper; 31, 36 and 48 pages respectively; published by the American Management Association, 330 West 42nd Street, New York 18. Price 50 cents, $1.25 and 75 cents per copy respectively.

Contents of these three booklets were presented at the Industrial Relations Conference of the American Management Association in New York, Sept. 27-28-29, 1944. The first is a comment on a ruling by the National Labor Relations Board that employers need not recognize foremen's unions, but that foremen are entitled to the protection of the National Labor Relations Act in that they not be discriminated against for union activity. The second is research report No. 6 and is presented under four headings: Nature of Foremen's Unionization; Legal Status; Formal Grievance Procedure; Consequences of Foremen's Unionization. This report is supplemented by a foreword and introduction, also a selected bibliography and references.

The third paper deals with contract clauses, wartime labor relations, management before the War Labor Board, and wage controls and wage outlook. The aim was to illustrate certain principles which can be utilized in all collective bargaining, rather than to give direct prescriptions to be utilized indiscriminately in any company.

. . . but for one foundryman

Radiography made the impossible *possible* . . . *and profitable!*

He made a series of castings . . . x-rayed each . . . got a step-by-step picture of what was wrong . . . perfected his technic . . . and delivered a sound casting.

SHRINKAGE REVEALED in the exhaust port of one of the experimental castings.

SHRINKAGE ELIMINATED as result of step-by-step development of casting technic.

RECENTLY a motor manufacturer designed a radically different type of crankcase. It was simpler and lighter than conventional designs and could be machined fast and economically.

Four foundrymen were called in to do the job. Two refused, said it would be impossible to cast. The other two agreed to try, but one gave up at the end of three weeks, said it couldn't be done. The other was meeting with success. He was x-raying each pilot casting, making a step-by-step analysis of shrinkage difficulties, eliminating them as they developed. Result? He developed a trouble-free casting technic that enabled him to supply *all* the crankcases originally scheduled for the job from the four foundries.

This is just another one of the many valuable ways radiography is serving industry. In addition to doing an outstanding job of non-destructive inspection, radiography is pointing the way to designers in reducing weight, safely . . . to engineers in specifying more efficient alloys and manufacturing methods, with assurance . . . and to fabricators in the use of new assembly technics of proved merit.

The increase in quality, lowering of cost, and speeding up of production, resulting from the increased use of radiography, will be particularly important in meeting tomorrow's opportunities. Eastman Kodak Company, X-ray Division, Rochester 4, N. Y.

RADIOGRAPHY

Analyzes . . . Instructs . . . Corrects . . . Improves

Kodak

All Cores O.K.!

For every Sand—the Right Grade of Certified Core Oil

There is no formula for a core oil which will give the best results under all foundry conditions; which is why we have long insisted that "core oils must be prescribed."

Each of the three general types of Certified Core Oil is manufactured in several grades of binding strength — the highest strength being equivalent to that of raw linseed oil—and the lowest being the grade used to spray cores for added surface toughness. Our "prescriptions" are made by experts and are based on years of experience and the knowledge acquired in serving thousands of foundries. To top it all, the cost will in most cases be less than that of the core oil you are now using.

Every gallon must live up to our claims—completely satisfy the user—or may be returned for full credit.

Certified Golden Core Oils, identified by their color, are made from the most select raw materials. Usually termed "conventional core oils."

Certified Unique Core Oils give the same results as our Golden Core Oils, but are made from off-colored materials which are dark in color and cost much less.

Certified Rapidry Core Oils are new core oils, also dark in color, and considerably lower in price. They bake quicker in the oven or at a lower temperature and provide more readily collapsible cores.

CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

3308-26 South Cicero Avenue, Cicero, Illinois

Stock and Representatives: Buffalo, N.Y. Elmira, N.Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. Milwaukee, Wisc. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn. Portland, Ore.

TYPICAL BRINELL HARDNESS NUMBERS OF SOME NONFERROUS ALLOYS

Copper-Base Alloys (Concluded)

Type Alloy	Condition	Cu	Sn	Zn	Pb	Al	Mn	Fe	Ni	Other	Brinell
Cu-Zn-Pb	Cast	Rem	3.0	9.5	7.0						55-65
Cu-Zn-Pb	Cast	Rem	1.5	24.5	3.0						50-60
Cu-Zn-Pb	Sand Cast	Rem	0.26	30.52	0.52			0.24			R_b 14
Cu-Zn-Pb	Chill Cast	Rem	1.52	33.20	1.89	0.44	0.84	0.76	0.21		94
Cu-Zn-Pb	Cast	Rem		35.0	2.6						55-65
Cu-Zn-Pb	Chill Cast	Rem		37.66	1.33	0.06		0.12			76
Cu-Zn-Sn	Chill Cast	83	4	7	6						55-60
Cu-Zn-Pb-Sn	Chill Cast	76	2	16	6			0.25		P 0.05	43-48
Cu-Zn-Pb-Sn	Chill Cast	74.5-77.5	0.8-1.2	21-23	0.3-1.20			0.20			40-60
Cu-Zn-Pb-Sn	Chill Cast	72	2	22	4			0.30		P 0.02	40-50
Cu-Zn-Pb-Sn	Chill Cast	70	1	27	2						50-55
Cu-Zn-Pb-Sn	Chill Cast	77	3	10	10			0.25		P 0.05	50-55
Cu-Zn-Ni	Cast	Rem	2.5	17.5	7.0			1.0	15.0		56
Cu-Zn-Si	Chill Cast	Rem		10.0		1.0	1.0			Si 3.0	207
	w.q. aged 570° F										55-65
Cu-Zn-Sn	Cast	Rem	5.0	5.0	3.0						56
Cu-Zn-Sn	Cast	84.65	5.17	4.67	4.8			0.23	0.36		50-65
Cu-Zn-Sn	Sand Cast	Rem	6.0	6.0							57-59
Cu-Zn-Sn	Sand Cast	69.0	1.0	30.0							

Sand Cast Aluminum Alloys

Type	Condition	Cu	Si	Mn	Fe	Mg	Ni	Zn	Al	Ti	Brinell
Al-Cu	H. T.-4	4.5	..	..	..	..	..	..	Rem.	..	65
Al-Cu	H. T. & Aged-6	4.5	..	..	..	..	..	..	Rem.	..	80
Al-Cu	H. T. & Aged-62	4.5	..	..	..	..	..	..	Rem.	..	95
Al-Cu	Aged 2 days R.T.	4.5	..	..	..	..	..	..	Rem.	..	46
Al-Cu	as cast	8.0	..	..	..	..	..	..	Rem.	..	50–70
Al-Cu	as cast	10.0	..	..	..	0.2	..	..	Rem.	..	100
Al-Cu	as cast	11.0–13.5	..	..	..	..	..	..	Rem.	..	75
Al-Cu-Fe	as cast	10.0	..	..	1.2	0.2	..	..	Rem.	..	85
Al-Cu-Fe	H. T.-2	10.0	..	..	1.2	0.2	..	..	Rem.	..	75
Al-Cu-Fe	H. T. & Aged-61	10.0	..	..	1.2	0.2	..	..	Rem.	..	100
Al-Cu-Mn	as cast	12.33	0.25	0.95	0.4	..	..	..	Rem.	..	75
Al-Cu-Ni	as cast	4.0	..	..	..	1.5	2.0	..	Rem.	..	80
Al-Cu-Ni	H. T. & Aged-61	4.0	..	..	..	1.5	2.0	..	Rem.	..	100
Al-Cu-Ni	Aged-571	4.0	..	..	..	1.5	2.0	..	Rem.	..	85
Al-Cu-Si	as cast	4.0	3.0	..	..	..	..	..	Rem.	..	55
Al-Cu-Si	as cast	4.5	1.2	0.3	..	..	..	..	Rem.	..	80
Al-Cu-Si	as cast	7.0	2.0	..	1.2	..	..	1.5	Rem.	..	55–80
Al-Cu-Si	as cast	8.0	1.2	..	1.0	..	..	..	Rem.	..	50–70
Al-Cu-Si	as cast	8.0	1.7	..	1.0	..	..	..	Rem.	..	110
Al-Cu-Si	annealed	8.0	1.7	..	1.0	..	..	..	Rem.	..	109
Al-Cu-Si	as cast	8.0	2.5	..	..	..	..	..	Rem.	..	65
Al-Cu-Zn	as cast	7.0	..	..	1.2	..	..	1.7	Rem.	..	70
Al-Mg	as cast	....	0.7	0.9	..	1.4	..	..	Rem.	0.3	40–60
Al-Mg	H. T.	....	0.7	0.9	..	1.4	..	..	Rem.	0.3	70–120
Al-Mg	as cast	....	1.8	..	..	3.8	..	..	Rem.	..	50
Al-Mg	as cast	0.37	0.19	1.0	0.28	5.96	1.49	..	Rem.	..	74
Al-Mg	H.T.-4	....	..	..	..	10.0	..	..	Rem.	..	75
Al-Mn	as cast	....	..	2.0	..	..	..	..	Rem.	..	85
Al-Si	as cast	....	5.0	..	..	..	..	..	Rem.	..	40
Al-Si	as cast	....	10.0	..	..	..	..	..	Rem.	..	45
Al-Si	modified	....	12.5	..	..	..	..	..	Rem.	..	50
Al-Si-Cu	as cast	3.0	4.0	..	..	0.3	..	..	Rem.	..	65
Al-Si-Cu	as cast	0.75	5.0	..	..	0.4	..	..	Rem.	..	97
Al-Si-Cu	aged	0.75	5.0	..	..	0.4	..	..	Rem.	..	148
Al-Si-Cu	H.T.-4	1.3	5.0	..	..	0.5	..	..	Rem.	..	60
Al-Si-Cu	H.T. & aged-61	1.3	5.0	..	..	0.5	..	..	Rem.	..	90
Al-Si-Cu	H.T. & aged-6	1.3	5.0	..	..	0.5	..	..	Rem.	..	80
Al-Si-Cu	H.T. & aged 51	1.3	5.0	..	..	0.5	..	..	Rem.	..	60

TYPICAL BRINELL HARDNESS NUMBERS OF SOME NONFERROUS ALLOYS

Sand Cast Aluminum Alloys

Type	Condition	Cu	Si	Mn	Fe	Mg	Ni	Zn	Al	Ti	Brinell
Al-Si-Cu	H.T. & aged-51	1.4	5.0	0.8	.	0.5	0.8	.	Rem.	.	65
Al-Si-Cu	H.T. & aged-59	1.4	5.0	0.8	.	0.5	0.8	.	Rem.	.	60
Al-Si-Mg	H.T. & aged-4	..	7.0	.	.	0.3	.	.	Rem.	.	55
Al-Si-Mg	H.T. & aged-6	....	7.0	.	.	0.3	.	.	Rem.	.	70
Al-Si-Mg	H.T. & aged-51	...	7.0	.	.	0.3	.	.	Rem.	.	60
Al-Zn	as cast	2.5	.	.	1.2	..	.	11.0	Rem.	.	70

Permanent Mold Aluminum Alloys

Al-Cu-Fe	Aged-52	10.0	.	.	1.2	0.2	.	.	Rem.	.	105
Al-Cu-Fe	H.T. & aged-65	10.0	.	.	1.2	0.2	.	.	Rem.	.	140
Al-Cu-Fe	H.T. & aged-551	10.0	.	.	1.2	0.2	.	.	Rem.	.	115
Al-Cu-Ni	Chill Cast	4.0	..	.	..	1.5	2.0	.	Rem.	.	105
Al-Cu-Ni	H.T. & aged-61	4.0	..	.	.	1.5	2.0	.	Rem.	.	110
Al-Cu-Ni	H.T. & aged-571	4.0	..	.	.	1.5	2.0	.	Rem.	.	105
Al-Cu-Si	H. T.-4	4.5	2.5	.	.	..	..	.	Rem.	.	75
Al-Cu-Si	H.T. & aged-6	4.5	2.5	.	..	..	..	.	Rem.	.	90
Al-Cu-Si	Chill Cast	7.0	1.7	.	1.2	..	..	.	Rem.	.	70
Al-Cu-Si	Chill Cast	7.0	3.5	.	1.2	..	..	2.0	Rem.	.	80
Al-Cu-Si	annealed-2	7.0	3.5	.	1.2	..	..	2.0	Rem.	.	70
Al-Cu-Si	Chill Cast	10.0	4.0	..	1.0	0.2	..	.	Rem.	.	100
Al-Mg	Chill Cast	....	0.7	0.9	.	1.4	..	.	Rem.	0.3	40–60
Al-Mg	H.T.	....	0.7	0.9	.	1.4	..	.	Rem.	0.3	70–120
Al-Mg	Chill Cast	....	.	.	.	3.8	..	1.8	Rem.	.	60
Al-Si	Chill Cast	....	5.0	.	.	.	..	.	Rem.	.	40
Al-Si-Cu	H.T.-4	1.3	5.0	.	.	0.5	..	.	Rem.	.	60
Al-Si-Cu	H.T. & aged-6	1.3	5.0	.	.	0.5	..	.	Rem.	.	90
Al-Si-Cu	H.T. & aged-51	1.3	5.0	..	.	0.5	..	.	Rem.	.	75
Al-Si-Cu	Chill Cast	4.5	5.5	..	.	..	..	.	Rem.	.	70
Al-Si-Cu	Chill Cast	0.8	12.0	..	.	..	..		Rem.	.	80
Al-Si-Cu	Chill Cast	1.0	20.0	.	0.7	.	..	.	Rem.	.	85
Al-Si-Mg	H.T. & aged-6	...	7.0	.	.	0.3	..	.	Rem.	.	90
Al-Si-Ni	Aged	1.2	10.0	1.4	.	.	2.4	.	Rem.	.	170
Al-Si-Ni	H.T.-4	0.8	12.0	.	0.8	1.0	2.5	.	Rem.	.	100
Al-Si-Ni	Aged-551	0.8	12.0	.	0.8	1.0	2.5	.	Rem.	.	105
Al-Zn	Chill Cast	2.75	.	.	..	.	..	13.5	Rem.	.	65–70

Sand Cast Magnesium Alloys

Type	Condition	Al	Si	Mn	Mg	Zn	Cu	Cd	Zr		Brinell
Mg-Al	H.T.-4	8.0	<0.3	>0.15	Rem.	<0.3	.	.	.	.	48
Mg-Al	as cast	10.0	<0.5	>0.1	Rem.	<0.3	.	.	.	.	54
Mg-Al	H.T.-4	10.0	<0.5	>0.1	Rem.	<0.3	.	.	..	.	52
Mg-Al	H.T. & aged-61	10.0	<0.5	>0.1	Rem.	<0.3	.	.	.	.	69
Mg-Al	as cast	12.0	<0.5	>0.1	Rem.	<0.3	.	.	.	.	65
Mg-Al	H.T. & aged-6	12.0	<0.5	>0.1	Rem.	<0.3	.	.	.	.	85
Mg-Al-Zn	as cast	4.0	.	0.3	Rem.	3.0	.	.	.	.	50
Mg-Al-Zn	as cast	4.5	.	0.4	Rem.	3.5	.	.	.	.	45–50
Mg-Al-Zn	as cast	6.0	<0.5	>0.15	Rem.	3.0	.	.	.	.	55
Mg-Al-Zn	H.T.	6.0	<0.5	>0.15	Rem.	3.0	.	.	.	.	55
Mg-Al-Zn	H.T. & aged	6.0	<0.5	>0.15	Rem.	3.0	.	.	.	.	70
Mg-Al-Zn	as cast	8.5	.	0.2-0.5	Rem.	0.5	.	.	.	.	60
Mg-Al-Zn	as cast	9.0	<0.5	>0.10	Rem.	2.0	.	.	.	.	60
Mg-Al-Zn	H. T.	9.0	<0.5	>0.10	Rem.	2.0	.	.	.	.	59
Mg-Al-Zn	H.T. & aged	9.0	<0.5	>0.10	Rem.	2.0	.	.	.	.	77
Mg-Cu	as cast	2.0	<0.5	>0.15	Rem.	<0.3	4.0	2.0	.	.	40
Mg-Mn	as cast	...	<0.3	1.2	Rem.	.	.	.	.	.	33
Mg-Zr	as cast	..	.	.	Rem.	.	..	.	0.5	.	38

INCREASE PRODUCTION AS MUCH AS 60%

REDUCE FUEL COSTS AS MUCH AS 50%

LAST LONGER BY AS MUCH AS 50%

TERCOD *Crucibles*

THESE demonstrable and repeatedly proved superiorities are, we believe, compelling reasons why you should write *now* for detailed information. ★ ★ You may be surprised to learn that TERCOD CRUCIBLES really do pay for themselves . . . and that crucibles can be protected against cracking, oxidizing, damage from fluxes, and life-shortening abuses, and *how*.

We shall be happy to send details if you will just ask for them in a letter on your company letterhead.

Electro REFRACTORIES & ALLOYS CORPORATION

Since 1919 . . . Manufacturers of Crucibles • Refractories • Stoppers • Alloys • Grinding Wheels

344 DELAWARE AVENUE BUFFALO 2, NEW YORK

CLEANING CASTINGS ON

Mass Production Basis

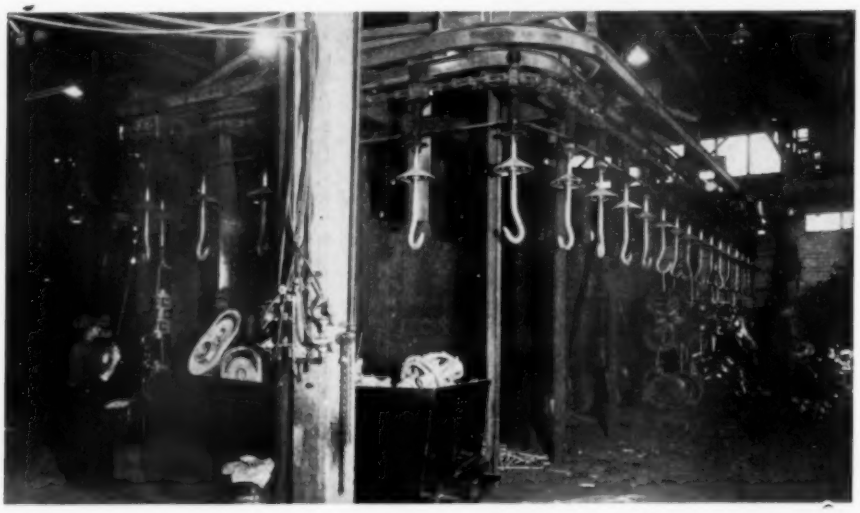


Fig. 1—One of two special cabinet conveyor machines installed by Crucible Steel Co., Milwaukee

By E. B. RICH
Chicago Engineer
American Foundry Equipment Co.

THE Crucible Steel Castings Co., Milwaukee, employs blast cleaning on a mass production scale, with heavy steel castings being carried through a blast room on an endless chain conveyor. Smaller castings are cleaned in short order in tumbling type of blast machines.

Two special cabinet conveyor machines were developed for the heavy castings. One operates as a "run-around" over an oblong path (Fig. 1) and the other follows an L-shaped path (Fig. 2). Differences in operating path were required by conditions of loading and unloading of castings.

The conveyor part of the special cabinets consists of an endless steel chain supported by rollers operating on the flange of an I-beam construction curved to form rounded corners. Suspended from each set of rollers is a heavy hook fitted with a sprocket. A casting is hung on the hook and when it travels through the machine the sprocket engages a mechanism that causes the casting to revolve under the blast of abrasive so that all surfaces of the casting are cleaned thoroughly. A conical shield on the hook prevents abrasive from reaching the sprocket. By the use of U-shaped auxiliary hooks it is possible to hang two or more of the medium size castings on the same conveyor hook.

The loading area of each special cabinet is located near the molding floor so that it can be served efficiently by the overhead crane. The discharge end of each machine is near the snagging floor, where the cleaned castings can be handled to grinders or acetylene cutters by crane or lift truck bins.

Sequence of the L-shaped path monorail cabinet blasting machine from the loading corner consists of a vestibule fitted with a series of heavy rubber split curtains to keep flying abrasive inside the cabinet, a blast room equipped with three blast wheels, another vestibule with split curtains, a touch-up room for hand blasting of spots inaccessible to the blast stream, and the exit vestibule with split curtain.

In the blast room the castings are moved over a U-shaped path. The blast wheels are located at different heights in a wall parallel to the sides of the monorail U, so that the castings on both sides of the U are subject to abrasive action. Because of this action, the layout is called a two-pass unit. In this room is also located the spinner drive, which rotates the hooks while they are subject to the abrasive blast.

The rectangular-path monorail cabinet blasting machine designed for handling heavier castings is similar to the previously described machine but with these exceptions: Location of the vestibules in relation to the blast room and the touch-up room is different. Also the blast room is three-pass. The monorail passes through this area in the shape of a letter S, so that the castings carried on it are subject three times to the action of the abrasive stream issuing from three wheel units mounted at varying heights in the wall of the room. The cycle of operation varies from 1½ to 2 minutes without using the touch-up room, and one minute if touch-up room is used.

Uses Apron Conveyor

Smaller steel castings are cleaned in a unit which consists essentially of an endless apron conveyor mounted in such a way that the parts to be cleaned are held in a semi-circular compartment. As the conveyor travels, the castings are carried up one side of the half-barrel and fall back continually on themselves, so that all surfaces are subject to the abrasive blast from the wheel.

Each of the monorail cabinets and the tumbling unit are equipped with a dust collector and separator system to remove broken shot from the recirculating system. Metallic shot is used.

The three-pass machine is handling approximately 80 tons of castings in eight hours, including delays such as lunch periods, waiting for loading buckets, etc., according to A. J. Dempsey, superintendent.

The three-pass machine and one tumbling unit are used to blast green castings as received from the shakeout. These castings have the gates and risers on them, and are dirty with surface encrusted sand and parts of cores. The bases of the risers and gates must be free from sand to facilitate cutting with the acetylene torch. The two-pass machine and one tumbling unit are used for finish blasting after annealing.

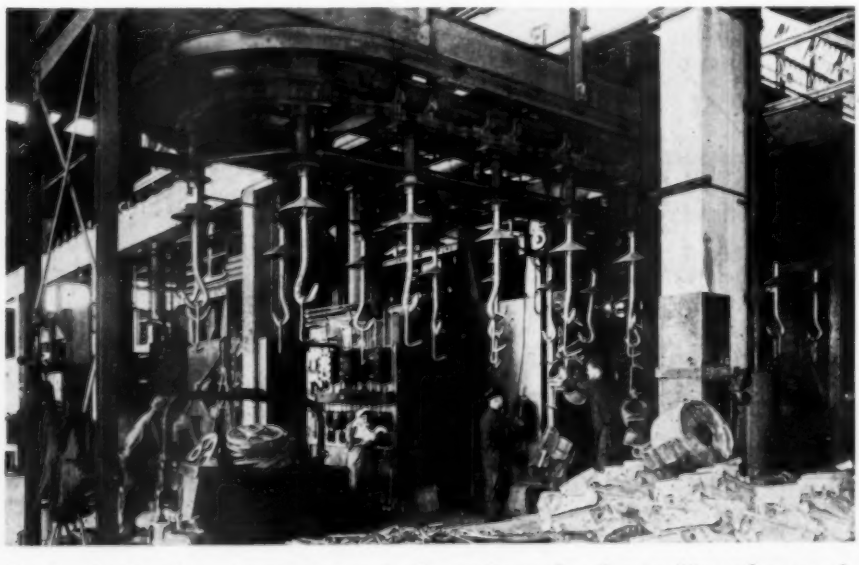


Fig. 2—Castings hung from conveyor hooks revolve under abrasive blast when traveling through machine

CROWN HILL

SEACOAL FACING

RAPIDLY BECOMING THE FOUNDRYMAN'S FAVORITE

To vent the mold quickly is the primary function of a seacoal—that's why Crown Hill is made from selected high volatile, quick-flash coal. At the same time, low sulphur content eliminates hard spots in castings caused by sulphur pickup. The fusion point of the little ash residue left is 2980°F.—molten iron can't fuse it. Castings peel easily and cleaning costs come down. Try it in your foundry and you'll understand why it is becoming the favorite with foundrymen everywhere.

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • Mines UPTON, WYO.

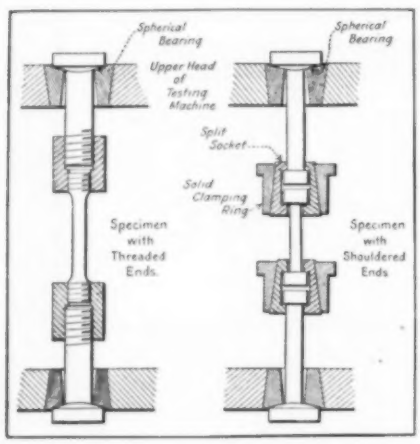
IN TWIN CITIES: The Foundry Supply Co., Inc., 2295 University Ave., St. Paul 4, Minn. IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.

WHAT ABOUT YOUR TEST BARS?

(*Continued from page* 87)

that cast iron can be designed to get particularly desired properties—and who know that carefully controlled production will result in uniformly good quality (just as in the production of any other metal)—will all agree that slip-shod tests can and will obscure particularly desirable physical properties that a given cast iron possesses. Thus, since quality cast iron is a controlled material it is necessary to exert as much care in making tests thereof as for any other material. If such care is not taken, any test (such as in tension) can, as your metallurgist friend says, have the following end result, ". . . . the inspector will reject a perfectly good gray iron casting . . . .".

There can be no doubt that the lack of a truly axial load in making a tensile test is a serious offense, probably even more serious than when ductile metals are tested. Special holders or shackles



Gripping devices, for threaded-end specimens (left) and shouldered-end specimens (right), from A.S.T.M. Standards

such as shown in Figs. 14 and 15 of "Standard Methods of Tension Testing of Metallic Materials, A.S.T.M. Designation E8-42," *A.S.T.M. Standards* 1944, Part I, Metals, page 967, are definitely required to avoid eccentricity of loading and consequently load readings that are not measures of the tensile strength. The A.S.T.M. diagrams also reveal that some work, machining, must be done in preparing the specimens. That should be expected because if the functioning of the part is important enough to have a particular strength specified it is important enough to spend a little time and money preparing specimens. The same is true for any other type of test.

Someone will always bring up the matter of correlation of test results and strength in the casting. A reference to the A.S.T.M. specification already mentioned will have to be sufficient answer for now. But it is well to note that a great deal of acceptance testing is required primarily to assure getting the same thing time and again and not necessarily to find out "what is in" a piece as cast.

Consequently, to be able to reproduce a given material we must have not only reproducible methods of manufacture but also reproducible methods of testing —methods that will measure significant differences in properties. There is little doubt that carelessness or indifference in maintaining axiality of loading in making tensile tests of cast iron can hide significant differences in strength and thus ". . . . reject a perfectly good gray iron casting. . . . ."

By WALLY LEVI
Lynchburg Foundry Co.
Lynchburg, Va.

OUR procedure for making and pulling test bars is as follows. All of our tensile test specimens are threaded on both ends. The threaded ends are screwed into holders of the proper size, and the holders are then screwed onto bolts held in the top and bottom heads of the testing machine. The bolt heads are machined so that they have spherical surfaces where they contact the bearing surfaces in the machine heads, and I believe that this insures pretty good alignment during the actual pulling of the bar. Another precaution which we take is occasionally to apply a small amount of fairly heavy lubricant to the spherical surface referred to.

By J. S. VANICK
International Nickel Co.
New York

THERE is no opposition to the ideal that "it is necessary to have the holders truly axial." The opposition comes from difficulty of defining "truly axial" within the mechanical design of the testing machine and within standard approved methods for the tensile testing of cast iron.

From a practical standpoint, all the tensile testing machines employ at least a ball and socket system of holders in an effort to obtain axial alignment as nearly perfect as is mechanically practicable. Gray iron is not a completely brittle material and therefore is capable of absorbing a considerable amount of misalignment. The degree of error that develops from ordinary misalignment is rarely enough to cause as great a deviation as 5 per cent from check tests. A deviation as bad as 10 per cent in a check testing program would warrant a thorough inspection and overhauling of the entire testing method.

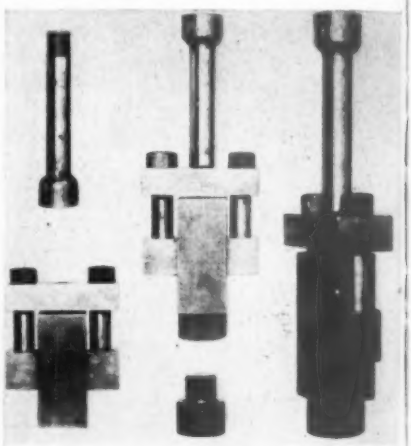
These are random estimates made with the knowledge that cast iron may vary 5 per cent in tensile strength due to differences in homogeneity. Much larger differences may occur if tensile specimens are selected eccentrically from a standard 1.20-inch diameter test bar or from quarter sections of larger diameter bars. In most cases of excessive eccentricity, the fracture calls attention to the irregularity. Machine operators almost habitually sight for alignment.

The foundryman whose castings are being rejected for low tensile strengths due to uncorrected misalignment, would be paying an enormous price for this neglect. In most cases, the testing equipment would be in such poor condition that the departure from "truly axial" could be seen by visual inspection of the specimen holders without the help of perpendicular gages and levels. The problem would be more acute in wedge grip testing such as is commonly used on malleable cast iron tensile specimens.

By JOHN W. BOLTON
Lunkenheimer Co.
Cincinnati

WHILE what your correspondent says is sound in principle, he exaggerates the seriousness of the problem. Back in the April, 1930, issue of THE FOUNDRY, pages 112 and 113, I discussed this problem of making tests as follows:

"The tensile test for gray cast iron has not received the prominence it deserves. The prevailing impression, which is largely erroneous, is that slight lateral stresses with long moments are present in all test



Various parts of Robertson shackles

bars and cause them to break, partly due to these forces rather than from the straight tensile pull. Thus, it is supposed that tensile stress values are in error. It is true that gray iron, although stretching quite readily within narrow limits, is not a ductile material. Therefore, careless loading in V-grips in testing machines which are seriously out of alignment, is likely to give false results.

"With simple and reasonable precautions these obvious sources of error may be eliminated and trustworthy results obtained. The Robertson shackle, self-centering and practically frictionless, is extremely well adapted to tensile testing of brittle materials. After making a number of carefully conducted comparisons between tests made on Robertson shackles and those with the ordinary ball-joint arrangement, Bolton concluded that the

(*Continued on page* 153)

SIMANAL

Fe Cr
HIGH CARBON

Fe Si
50 · 75
85 · 90%

not ferro-alloys alone

Fe Mn
STANDARD

IN ANY FIELD of activity where progress is being made, the known is but a small part of the knowable. Text books and manuals are seldom printed until experience has proved the accuracy of the knowledge collected therein. Hasty conclusions set down as gospel can hold up genuine advances, and hinder the scientific spirit. The Ohio Ferro-Alloys Corporation has insisted upon freedom of action for its field service men, knowing that seldom does a problem follow the book in every detail. Questions arise that no one has answered before, but they *must be answered.*

PRODUCTION-WISE TECHNICAL ASSISTANCE

Having chosen men of sound theoretical training and broad practical experience as representatives, we believe their unrestricted, intelligent efforts in cooperation with modern metal-makers will lead to better ferro-alloy practice. In this service Ohio Ferro-Alloys Corporation realizes an ambition to be more than a supplier of consistently uniform products. If you are up against a tough metallurgical problem or development which involves ferro-alloys, we invite you to call on us for production-wise technical help.

FERRO-SILICON
50 • 75 • 85 • 90%
FERRO-MANGANESE
H C FERRO-CHROME
BOROSIL•SIMANAL
BRIQUETS
SILICON · MANGANESE · CHROMIUM

DEPENDABILITY · PHILO · QUALITY · SERVICE

© OFA 1935

DEPENDABILITY · RAINIER · QUALITY · SERVICE

© OFA 1941

Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

FOR GOOD *Production* AND USE *Performance*...

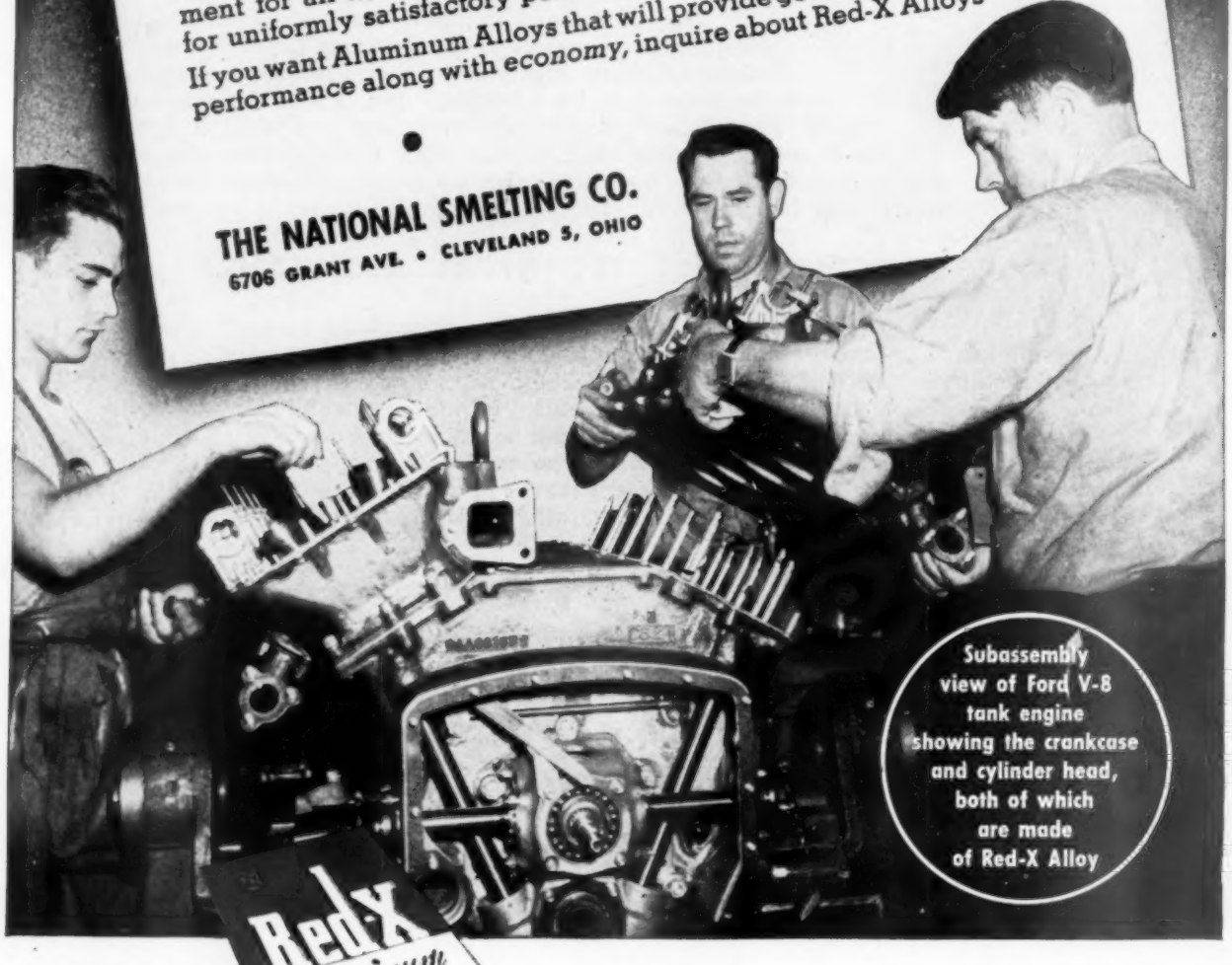
Red-X ALUMINUM ALLOYS

An important advantage of Red-X Alloys in the production of such critical parts as engine cylinder blocks, crankcases, and cylinder heads, is the fact that their carefully developed composition affords good castability. This results in greater freedom from defects, such as shrinkage porosity, cracks, and so-called cold shut or welds, and provides castings of desirable physical properties.

Used in automotive, marine, and railroad fields, as well as in armament for all branches of the Services, Red-X Alloys are noteworthy for uniformly satisfactory performance.

If you want Aluminum Alloys that will provide good production and use performance along with *economy*, inquire about Red-X Alloys—today.

THE NATIONAL SMELTING CO.
6706 GRANT AVE. • CLEVELAND 5, OHIO



Subassembly view of Ford V-8 tank engine showing the crankcase and cylinder head, both of which are made of Red-X Alloy

Write For A Copy Of This Booklet

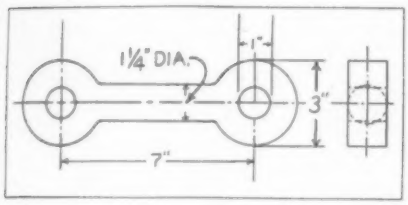
NATIONAL SMELTING

(*Continued from page* 150)

tests made with the latter method are sufficiently accurate for any practical purpose. As a matter of fact, series of parallel tests will average within 2 or 3 per cent. Furthermore, when reasonable care is used, wedge grips can be employed successfully. By casting a specially shaped bar such as shown here, it is possible to obtain a fair alignment without a special centering device."

Any iron that is so lacking in "ductility" that tensile results are thrown off seriously is a good iron to avoid. There might be border line cases where the iron was a couple of hundred pounds off the specification minimum. The remedy is to keep a reasonable amount above the minimum for the average.

Has the metallurgist proved his point by use of Robertson shackle? Has he put extremely sensitive S-R gages on each side of a steel bar and found that even the



lead of the thread in the bar head causes some eccentricity?

The easiest answer to the problem is simple ball joint holders to accept the threaded ends. No good testing engineer would use V-grips or wedge grips. The eccentricity of the pulling head of the testing machine, in relation to the stationary head is (on some older machines, or on two light machines) a more likely source of loss of axiality than the grips themselves.

Gray iron is rarely used in anything approaching pure tension. Nonaxial loads are the expectation. It does (or should) have reasonable plasticity to compensate for any reasonable deviation from pure axiality.

By A. J. EDGAR

Gray Iron Founders' Society
Washington

AFTER discussing this problem with other foundry metallurgists, I have come to the conclusion that the foundry metallurgist who has raised the question about pulling test bars may be in a position of not being able to meet some specifications that have been placed before him.

I have been informed that even though a gray iron test bar is out of line as much as ⅛-inch, provided ball joints are used in the test heads, the results will only be off about 1/10 of 1 per cent and it is very unlikely that any machine could be off more than ⅛-inch, if it is kept in any kind of condition. The important thing, of course, is that the ball joints be used when testing gray iron.

I think that the one very important matter to be investigated is the ability of foundrymen to produce good sound test bars. It has been my experience in the past that test bars have failed because they have not been properly made. The foundry metallurgist should spend time in studying this procedure in the preparation of test bars, pouring temperatures, type of sand used, etc.

By TOM E. EGAN

Cooper-Bessemer Corp.
Grove City, Pa.

IT is possible to load eccentrically any piece of metal in a testing machine and obtain false results. This is especially true when flat test specimens are used. If in the testing of gray iron the test specimen is the 0.8-inch diameter A.S.T.M. design and if it is held in the tensile machine by using spherical ends in the head of the machine, there is very little danger in not pulling the specimen truly axially.

I asked our engineers to figure out the percentage difference in the fiber stress of an 0.8-inch specimen where there was 8 inches between the two spherical ends of the piece, which is the average distance that we have in our own tensile machine. Considering that the pulling was done with the two heads $\frac{1}{8}$-inch out of alignment and ¼-inch out of alignment, they tell me that the difference in fiber stress at the edge of the specimen will be absolutely negligible with this setup, that the percentage difference would be in the order of 0.0001 per cent for $\frac{1}{8}$-inch and approximately 0.01 per cent for ¼-inch out, so I do not think that the low tensile strength as recorded by the tensile machine can be attributed to non-axial loading.

The greatest difficulty that I can see in the variation that we get in testing gray iron is that we usually use the 1.2-inch arbitration bar for tensile strength although this arbitration bar can vary as much as 7000 to 8000 pounds per square inch. Furthermore, it can be relatively porous due to the fact that there is no metallic head on the mold to allow for the ferrostatic pressure to keep the bar solid. The second thing is the machining of the test bar itself. I have seen literally thousands of these 0.8-inch test bars machined and I have come to the conclusion that it is a difficult test bar to make properly in that we have to blend a straight section with a rather broad radius, and to do this takes quite a little bit of care in handling in the lathe. It requires a good machinist to be able to do the job properly. So with a good machine which is within reason in its ability to pull any specimen axially and the use of spherical seats at the end of the head, I am not too much afraid of eccentric loading. However, I am afraid of the test specimen if it is not machined properly. It is essential that we do have a spherical seat in the heads because it can be very easily figured out that any other type of seat will put a bending moment on the specimen which is very high and could cause trouble. Most machines are designed for spherical seats.

Another thought that comes to mind in reference to testing gray iron is that we often forget the 1.2-inch arbitration bar does not always represent the physical properties which one would obtain in a casting. I have seen thousands of dollars worth of castings rejected because of a failure due to low tensile strength of the 1.2-inch arbitration bar, yet these castings would serve amply the purpose intended. In fact, we have used a great number of them that have failed in the test and found them to be all right. No test is better than its interpretation and I believe that all physical properties determined by the arbitration bar should be rejected or accepted with due consideration for the service requirements of the casting.

There is a fallacy which is being followed today. An engineer will specify say 40,000 pounds minimum tensile strength in the arbitration bar, yet an iron of analysis that will produce this 40,000 pounds tensile strength is absolutely the wrong type of iron to use in the casting because of its design and section size. Hence, we put the foundryman up against the problem of producing a good casting or a good test bar. By far the most interesting to me is the good casting.

By PROF. JASPER O. DRAFFIN

College of Engineering
University of Illinois, Urbana, Ill.

CAPT. W. L. COLLINS, Ordnance Department, U. S. Army, and I have made a number of tests of cast iron bars with the load applied eccentrically as well as axially, and we have found that the action is not as simple as it is sometimes assumed to be.

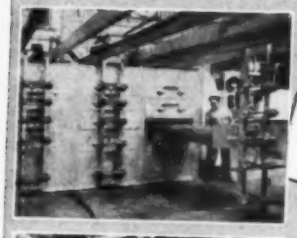
Recently we prepared 18 tensile specimens, similar to those specified in the A.S.T.M. specifications, from six cast iron bars, three specimens from each bar. The specimens had threaded ends, ⅝-inch diameter and a reduced cylindrical portion about 0.400-inch diameter. Six had the threaded portion axial with the reduced portion, six had the reduced portion offset 0.06-inch from the axis of the threaded ends and six had the reduced portion offset 0.11 inch from the axis of the threaded ends. These were prepared in order to simulate somewhat the condition of imperfect machining which sometimes occurs. They were all tested without spherical loading pins, the grips being held rigidly in the testing machine.

The average ultimate strengths obtained were as follows:

Eccentricity, inch	Ult. Str. psi	Reduction in Str., %
0.00	25,600	0.00
0.06	24,600	4.07
0.11	21,800	14.87

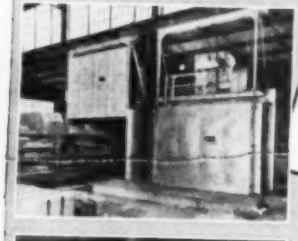
These data show an appreciable and consistent decrease in the ultimate strength as the eccentricity of loading is

COLEMAN Portable Core Ovens

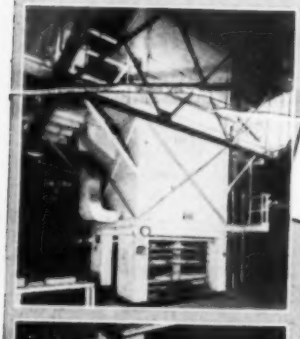


COLEMAN Rolling Drawer Ovens

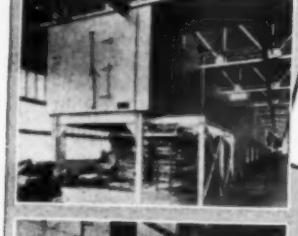
COLEMAN Transrack Ovens



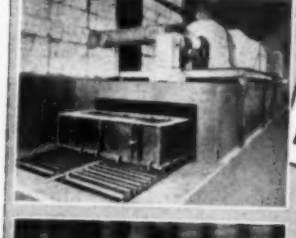
COLEMAN Car Type Ovens



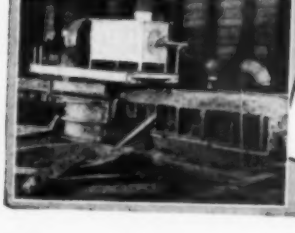
COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens



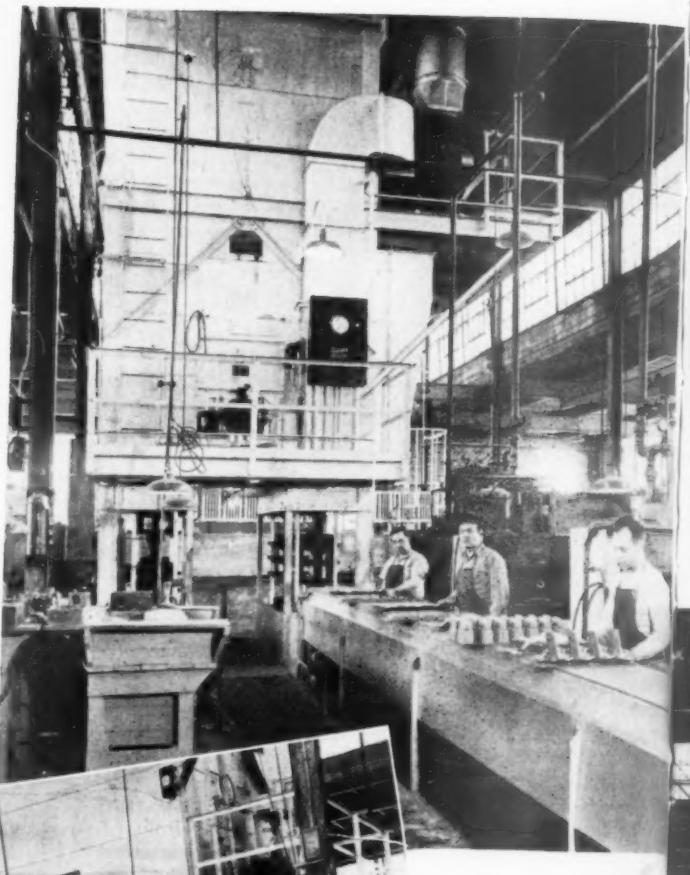
COLEMAN Conveyor Mold Ovens



COLEMAN Portable Mold Dryers

Coleman Towe

a



Patented Cente Passageway

Permits loading o Coleman Towe Ovens from both in side and outside, in creasing loading a cessibility as much 300% compared wit other vertical ove designs.

The FOUNDRY EQUIPMEN Co

BUILDERS OF COLEMAN AN WAR

CLEVELAND 13 OHI

...eOven Proves Dependability ...at New York Air Brake Company

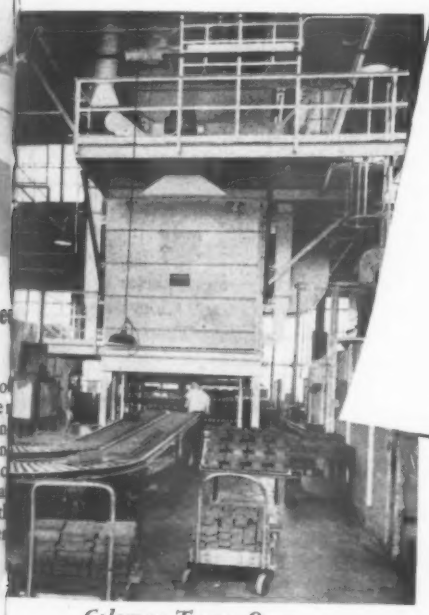
●This enthusiastic endorsement is typical of the service and satisfaction that has been obtained in every Coleman Tower Oven installation.

Coleman Tower Ovens bake cores *faster* and *better* with *less fuel* and *less labor.*

Coleman Oven Engineers pioneered the development of conveyor type core ovens. The extensive experience gained in building hundreds of installations is incorporated in every Coleman Oven.

Coleman Core and Mold Ovens are built in all types and sizes to meet every operating requirement.

Write for Folio of Bulletins



Coleman Tower Oven—unloading side.

ESTABLISHED 1890

THE NEW YORK AIR BRAKE COMPANY

WATERTOWN, NEW YORK

M. B. DULICK
ASST. TO THE FIRST VICE PRESIDENT

March 10, 1945

Mr. C. A. Barnett,
President & General Manager,
The Foundry Equipment Company,
Cleveland 13, Ohio

Dear Mr. Barnett,

In reply to your letter of March 5th we are glad to give you our general observations on the Coleman Tower Core Oven installed last year.

The Coleman Tower Oven has been in operation continuously twenty to twenty-four hours per day, seven days per week, for the past six months, which certainly proves its dependability under uninterrupted operation.

Coremakers and oven tenders prefer this equipment because of its lessened heat exposure and the fact that the cores come through the unloading position free from smoke and fumes.

We prefer the Tower oven because the resultant cores are more uniformly baked than with any other equipment we have ever used, and, hence, our spoilage is less and, our entire operation is more economical.

You may be sure we are pleased with this installation and are glad to highly recommend it.

Yours truly,

A B Gulick

HSG/m

...Company
...AND WARTWOUT OVENS
...13 OHIO, U. S. A.

COLEMAN
CORE AND MOLD
OVENS

increased. Yet the amount of the decrease is not as great as might be expected from the conventional analysis of stresses due to eccentric loads. The difference between what was found and what might be expected may be due to a partial release of the eccentricity or it may be due to the material itself, since the modulus of rupture of cast iron is much greater than the tensile strength.

Before any final answer can be given to the question of axial loading of tensile test bars, a considerable amount of study must be given to the subject and a good many carefully controlled tests must be made.

By J. J. KANTER
Crane Co.
Chicago

THE comment regarding the effect of eccentric loading in tensile testing of gray iron has been noted with interest. The opinion expressed, however, is in need of certain qualifications.

It is true that when tensile testing a nonductile material, emphasis should be placed on the observation of axial loading conditions. Many years ago it was common practice to tensile test cast iron using wedge grips on rough cast ends. This indeed was a poor practice and yielded unreliable results. All current standard specifications requiring the tensile testing of cast irons, however, seem to recognize the importance of axial loading by requiring that tests be made upon threaded end bars to be pulled in by self-aligning types of holders. So far as we are aware, it is the practice to test cast irons in accordance with the requirements of the standard specifications and thus, it would not seem that results so obtained would be as bad as your correspondent thinks.

While it is true that discordant results might be obtained upon a screw-type tensile machine with a "weaving" crosshead, even though self-centering holders and threaded end bars are used, an iron so brittle as not to be capable of withstanding a slight departure from ideal loading, may also be too fragile for use.

By WILLARD H. ROTHER
Buffalo Foundry & Machine Co.
Buffalo

I AGREE in part that it is necessary to have the holders of a testing machine in a truly axial plane for cast iron to get the best results. However, I feel that it is also essential that the holders be in an axial plane for ductile bars as well.

In our experience we have had some sad results on bronze test bars because of the lower head in the testing machine not being parallel with the upper head. Results obtained were low because of stresses that were set up in the test bar itself, due to misalignment caused by slight discrepancies in the machine. When this condition exists, test bars are subjected to additional stresses beyond the tension stress, giving decidedly low results. This of course applies to the V-grips and does not apply to the ball joint which is self adjusting.

The A.S.T.M. bar is a threaded bar and generally is screwed into holders having self adjusting ball joints. To my knowledge there are very few cast iron test bars today that are made and pulled in any other way.

The nonferrous and steel bars are generally machined for V-grips and naturally would be subjected to stresses other than tension if the grips on the lower and upper head of the machine were not in an axial plane.

By R. J. ALLEN
Worthington Pump & Machinery Corp.
Harrison, N. J.

APPRECIATING the fact that cast iron is an inherently brittle material we take the necessary precautions to see that the test piece is properly aligned before making the test and through so doing we have found that our results are consistent and as anticipated. The testing machine must be in good mechanical condition and the spherical seats on the grips must be kept lubricated and free from dirt.

When walking on a slippery street one naturally exercises more caution than when walking on the dry pavement. Likewise when testing cast iron one exercises more care than when handling the more ductile materials.

Form Business Paper Group of C.E.D.

Formation of a business publications action and advisory committee of the Committee for Economic Development has been announced by Paul G. Hoffman, C.E.D. chairman. John H. Van Deventer, president and editorial director of *Iron Age*, New York, is chairman of the editors' committee.

"Recognizing the importance of the business press in stimulating planning now for high level, productive postwar employment, we have set up this committee to serve publications which cover every field of commerce, industry and the service trades," Mr. Hoffman said.

"The committee will issue special releases based on C.E.D. programs and activities and will slant these to the business press and to its component parts. Later this national committee will be supplemented by area groups in centers of publication," he added.

The committee members, in addition to Mr. Van Deventer, are: Edward H. Ahrens, publisher and editorial director, *Hotel Management*, New York; Carl W. Dipman, editor, *Progressive Grocer*, New York; Charles Downes, editor, *Distribution and Warehousing*, New York; Samuel C. Dunn, president, Simmons-Boardman Publishing Co., Chicago; Julius Elfenbein, editor, *House Furnishings Review* and *Linens and Domestics*, New York; William W. Gothard, editorial director, Institution Magazine, Chicago; George T. Hook, editor, *Commercial Car Journal*, Philadelphia; W. E. Irish, editor, *Industrial Equipment News*, New York; L. E. Jermy, editor, *Machine Design*, Cleveland; James G. Lyne, associate editor, Simmons-Boardman Publishing Co., New York; H. J. McKeever, editor, *Roads and Streets, Chicago;* John W. McPherrin, editor, *American Druggist*, New York; Harold H. Rosenberger, editor and publisher, *Practical Builder*, Chicago; Earl Shaner, president, Penton Publishing Co., Cleveland; George F. Taubeneck, publisher and editor, *Air Conditioning & Refrigeration News*, Detroit; Paul Trimble, editor and general manager, *National Cleaner & Dyer*, New York; Ernest Trotter, editor, *Printing*, New York; Ralph E. Turner, editor, *Power Plant Engineering*, Chicago; Rex Wadman, publisher and editor, *Diesel Progress*, New York, and president, National Business publishers Association.

Cleveland Pneumatic 50 Years Old

In observance of its 50th anniversary the Cleveland Pneumatic Tool Co., Cleveland, has published an attractive bulletin describing the development of the company from a small organization of ten men to a vast industry employing thousands.

Founded in 1894 by Claus Greve, a native of Denmark, the original name of the organization was the Union Electric Co. In 1899 the name was changed to the Cleveland Pneumatic Tool Co. and Mr. Greve was elected president. He served until 1931 in this capacity when he became chairman of the board and took an active part in company affairs until his death in 1936. Louis W. Greve succeeded his father as president in 1931 and held that office until his death in 1942.

Officers of the company are: President, George P. Torrence; vice presidents, Herbert W. Foster, Fred B. Greve; financial vice president and treasurer, John S. Clark; secretary, Harlan B. Collins. The company now is actively engaged in the production of couplings, riveters, rock drills, drop forging, sand rammers, tampers, grinders, aerol retractable landing gears, turret lathes, corebreakers, and other war items intimately connected with prosecution of the general war effort.

Foundry Supply Firm Issues Catalog

Snyder Foundry Supply Co., 2444 East 57th street, Los Angeles, has issued a new bound catalog listing the various equipment and supplies it handles. The catalog also includes pictures of its warehouse facilities and a brief history of the company, which was founded by G. F. Snyder in 1917. Mr. Snyder, G. W. Effinger and W. G. McLean now are general partners in the business.

Unlimited supplies of magnesium alloy ingots

Plus 29 years of Dow experience are now at your service

The materials you need to produce sound, easily machinable castings of magnesium are yours—*in full volume*—from the vast resources of The Dow Chemical Company.

First, of course, is the lightweight metal itself—available now in unlimited quantities. The complete Dow magnesium line includes pure magnesium metal, unique in its ability to eliminate needless weight . . . ingots of the many Dowmetal magnesium alloys, developed to meet precise property requirements . . . and a full selection of fluxes, protective agents and welding rod.

In addition, Dow offers still another ingredient essential to fine magnesium products: the technical service made possible through 29 years of experience in producing, alloying and fabricating magnesium. An expert staff is available for consultation with you. Call on Dow when your plans call for magnesium.

DOWMETAL

magnesium

THE METAL OF MOTION

MAGNESIUM DIVISION, THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

Activities of foundry GROUPS

Pittsburgh

SIMPLIFICATION of foundry practices and greater precision in casting methods should be combined with greater unity within the foundry industry as a step toward increasing the size of foundry markets, both now and after the war, according to D. J. Reese, speaking before the March meeting of the Pittsburgh Foundrymen's Association.

Basing his statements on his experiences as a member of the War Production Board, Mr. Reese pointed out that lack of understanding as to the abilities of the foundry industry is its greatest stumbling block, and that the attitude of getting more lax specifications rather than making castings up to given specifications has become ingrained in some shops.

Technological advances in the foundry industry are such that it is no longer necessary for any foundry to make imperfect castings, regardless of the size, shape and material involved. Also, it is possible for the foundry to produce nearly all metal parts to as exacting specifications and with as good service results as by any other method.

The chief difficulties involved are twofold, according to the speaker. The industry is not forward in its adoption of new technology, and it is backward in adopting uniform promotion practices aimed at spreading knowledge about castings among metal fabricators.

Precision casting methods have been developed which permit close dimensions on parts in the as-cast condition. Wider use of this idea should result in a vast increase in casting demand, simply because it would reduce the cost of the finishing operations. Centrifugal casting, the investment or lost-wax process and other new developments are important in this category and should be more widely used than they are at present.—*Robert L. Hartford.*

Canton

CANTON District Chapter of the A.F.A. met March 22 at the Elks' Club, where 87 members and guests heard Clyde L. Frear, senior materials engineer, Bureau of Ships, U. S. Navy, give an illustrated talk on "Non-Destructive Testing."

Mr. Frear began his lecture by explaining the source and nature of X and gamma rays and their relation to radio, visible, and cosmic waves. In spite of its inherent scientific complexity, the subject was presented in such a manner that members of the audience not familiar with physics could easily understand.

The application of gamma and X-rays in ferreting out faulty castings, along with slides illustrating actual problems, took up the greater part of the lecture. The remarks on magnetic testing were of interest to many, judging from the number of questions asked by the listeners. This lecture was of such general interest to the entire group that it is hoped that other chapters may have the opportunity of hearing Mr. Frear at some time in the future.—*Nils E. Moore, reporter.*

GRAY IRON OPERATORS: *Officers of the Operators' Group, Gray Iron Research Institute Inc., at the recent quarterly meeting in Cleveland. Shown left to right are: Chairman, J. C. Alberts, Plainville Casting Co., Plainville, Conn.; vice chairman, Oscar Woehlke, Spring City Foundry, Waukesha, Wis.; secretary, Sam Appelby, Buffalo Foundry & Machine Co., Buffalo. (Photos on this and following page courtesy D. E. Krause, Battelle Memorial Institute, Columbus, O.)*

Gray Iron Research Institute

GRAY Iron Research Institute Inc., a group of gray iron foundries incorporated in the state of Ohio for the purpose of promoting research on improved properties of gray cast irons, held its regular quarterly meeting at the Statler Hotel, Cleveland, April 4, 5 and 6. The first day of the meeting was devoted to the business activities of the executive and research committees, while the second and third days were devoted entirely to roundtable discussions by members of the Operators' Group of the organization.

The Operators' meeting drew an attendance of approximately 60 foundry superintendents, metallurgists and foremen from the 23 individual foundries involved (including 20 representatives from Cleveland) to a two-day meeting devoted to discussions of current foundry problems and the application of recent research activities to foundry technology.

Under the able chairmanship of Jack Alberts, Plainville Casting Co., Plainville, Conn., discussions were held on foundry control records, reports on the research work carried out at Battelle Memorial Institute, analysis of defective castings, technique of hot blast cupola operation, dry and green sand core blowing possibilities and problems, effective use of correct gates and risers, effective maintenance of sand-handling systems, conveyors, cutters, mixers, core blowers, molding machines, and melting equipment. Discussion leaders for the two-day session on improved foundry technology included: W. A. O'Brien, Electric Auto-Lite Co.; J. L. Brooks, Muskegon Piston Ring Co.; Lee Woehlke, Grede Foundries Inc.; H. C. Winte, Worthington Pump & Machinery Corp.; Otto Fleck, Fremont Foundry Co.; W. J. Feth, Forest City Foundries Co.; and Tom E. Barlow and D. E. Krause of Battelle Memorial Institute.

The evening meeting of the group covered a motion-picture analysis of the operation of experimental cupolas and an

(*Continued on page* 160)

IT'S NOT CHILD'S PLAY

Team up with MOGUL and KORDEK — you can depend on them.

KORDEK

KODEK is a perfect DRY BOND which can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.

TURNING out money-making castings is not child's play. It's man's work . . . and it takes skill and experience and "know-how".

Most foundry men use and value MOGUL and KORDEK because they have fewer discards, hence more profitable production.

MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.

MOGUL works with core oil; it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or resin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.

CORN PRODUCTS SALES CO. **17 BATTERY PLACE NEW YORK 4, N. Y.**

GRAY IRON RESEARCH: *Shown at the quarterly meeting of the Gray Iron Research Institute Inc. are: (Top row)—John Fienning, Chicago Hardware Foundry Co., North Chicago, Ill.; Roger Hageboeck, Spring City Foundry, Waukesha, Wis.; Henry C. Winte, Worthington Pump & Machinery Corp., Buffalo. (Center row)—W. A. O'Brien, Electric Auto Lite Co., Toledo, O.; H. M. Hazeltine, Fremont Foundry Co., Fremont, O.; Joseph L. Brooks, Sparta Foundry Co., Sparta, Mich.; Edward L. Lally, Forect City Foundries Co., Cleveland. (Bottom row)—Frank G. Steinebach,* THE FOUNDRY, *Cleveland; C. F. Seelbach, Forest City Foundries Co., Cleveland, and president of the institute; J. C. Alberts, Plainville Casting Co., Plainville, Conn.; Tom E. Barlow, Battelle Memorial Institute, Columbus, O.*

(*Continued from page* 158)
unusually interesting motion picture on Foremen's Training. Guests at the evening meeting included Frank G. Steinebach, THE FOUNDRY, and James G. Goldie, Cleveland Trade School.—*Tom E. Barlow.*

Central New York

AFTER a recess of one month, due to the ban on public gatherings in the area, the Central New York Chapter of the A.F.A. resumed its activities March 9 at a meeting held at the Onondaga Hotel, Syracuse, N. Y. Chapter Chairman L. E. Hall presided and introduced Tom E. Barlow, Battelle Memorial Institute, Columbus, O., to the seventy-odd members and guests present. Mr. Barlow's subject was "Gray Iron Structure."

The speaker began his talk by describing the difference in ladle additions for alloying and those for structure control. He stated that elements added to the ladle for alloying purposes are present in the chemical analysis, while those added for structure control do not show. There are two types of inoculants—graphitizing and stabilizing, the type to be used depending on the analysis of the iron and results desired. This can be determined only by experimentation for each particular foundry.

Mr. Barlow presented a series of slide charts and pictures to show the benefits of ladle inoculations for irons of various compositions in regard to tensile strength, hardness, grain size, etc.

Following the formal meeting and discussion period refreshments were served and the meeting was divided into groups where foundry problems and experiences were exchanged. This was the first time such a procedure was tried and there was little doubt as to its popularity. These informal sessions should greatly increase the interest in the monthly meeting.—*John A. Feola, reporter.*

Chesapeake

MARCH 23 meeting of the Chesapeake Chapter of the A.F.A. was held at the Engineers Club, Baltimore. Guests introduced by Chapter Chairman H. A. Horner included Hermann P. Goode, Textile Machine & Foundry Corp., Reading, Pa.; John Rob, vice chairman, Philadelphia Chapter of the A.F.A.; Frank Fay, Landis Tool Co., Waynesboro, Pa.; A. J. Edgar and John Mullin, Gray Iron Founders' Society, Washington.

A feature of this meeting was the presentation of several foundry souvenirs to Fred Roemer, foundry superintendent, Balmar Corp., Baltimore, who is retiring to his home in Franklin, Pa., after 40 years in the foundry industry. The gift, which was presented by Ed Horlebein on behalf of the chapter, consisted of jars of old foundry sand, new foundry sand, bentonite, cereal binder and molasses. A small core box was given to him and also a split core, which when opened was found to contain a pen and pencil set.

Max Kuniansky, Lynchburg Foundries, Lynchburg, Va., was speaker of the evening and discussed gray iron foundry practice and problems, illustrating his talk by use of slides.—*Erle J. Hubbard, reporter.*

Philadelphia

MARCH 9 meeting of the Philadelphia Chapter of the A.F.A. was held at the Engineers' Club, Philadelphia, with 80 members and guests in attendance. F. G. Sefing, International Nickel Co., New York, was the speaker.

It was agreed that this was the most outstanding meeting held this year. Mr. Sefing discussed gates and risers, and with slides demonstrated the importance

(*Continued on page* 162)

NEW JERSEY: *A large turnout of the New Jersey Foundrymen's Association attended the group's March 27 meeting to hear a talk by W. W. Rose, executive vice president, Gray Iron Founders' Society*

It takes all kinds of castings to win this war and we have to get molds for the big ones out just as fast as for the small ones. Speed and accuracy are essential—and we get both from our Herman Molding Machines. The mold shown above was produced on a Herman Plain Jarring Machine. This is a big mold and is perfectly rammed.

Any size mold is better rammed on a Herman. Foundries throughout the nation and abroad are taking advantage of the superior design and engineering features built into the Herman Molding Machines which have enabled them to set the pace for the industry and remain the leaders in this field. Herman's forty years of exclusive Molding Machine design and experience in whipping every type of foundry molding problem can now play an important time-saving and money-saving part in helping you to increase production and lower costs to meet the demands of the War Program.

Our experienced field engineers will be glad to call on you and discuss your problems without obligation.

HERMAN

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

(*Continued from page* 160)

of using the correct type for the manufacture of all kinds of castings. The speaker discussed each slide, and the numerous questions asked from floor clearly showed how conscious the Philadelphia foundrymen are of the importance of proper gates and risers.

Charles Schley, Philadelphia Brass & Bronze Co., acted as technical chairman for the nonferrous group, and Charles Mooney, Olney Foundry Division of Link Belt Co., served in the same capacity for the ferrous group.—*B. A. Miller.*

New Jersey

GRAY iron castings have proved to be one of the most essential war materials," said W. W. Rose, executive vice president, Gray Iron Founders' Society, in addressing the March 27 meeting of the New Jersey Foundrymen's Association, at Newark, N. J.

Continuing, Mr. Rose stated: "At first it was assumed that this was going to be a steel, copper, and aluminum war, but as the need for tanks, trucks, and landing craft developed, it became apparent that it was very largely a gray iron war. Actually, leaving out steel mills and blast furnaces, the annual consumption of gray iron exceeds that of all other engineering materials combined. Gray iron castings are required either as a component part of the product itself or of the machinery needed to produce it—in the manufacture of practically every known product—automobiles, ships, steel, textiles, glass, chemicals—everything, including all important war products."

The early neglect of the gray iron foundry industry by war agencies caused it to become a bottleneck which seriously handicapped our war effort, and recently war agencies have been frantically trying to make up for this mistake and to speed up production of gray iron castings. The industry is now being accorded preferential treatment in many ways, due largely to the fact that it is now effectively publicizing its product through a strong national trade association, the Gray Iron Founders' Society. Separate industry statistics are now being published for the first time by the Bureau of the Census. The only government agency that has not yet waked up to the importance of gray iron is the OPA, which is seriously hampering the production of this important material by trying to hold the industry down to the impossibly low profit of 4 per cent on sales before taxes."

Mr. Rose prophesied a postwar boom in gray iron because it is required in a host of civilian products for which there is a tremendous pent-up demand, products such as washing machines, refrigerators, oil burners, automobiles, etc. To make the most of this opportunity, he stressed the importance of sound costing, good housekeeping, education, and research.

Chapter President M. J. Hogan presided. H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J., and vice president of the Gray Iron Founders' Society, introduced the speaker. John L. Carter, cost consultant, Gray Iron Founders' Society, appealed to all those present to participate in the survey of cost methods now being conducted by the society in New Jersey.—*Ben K. Price.*

Quad-City

QUAD City Chapter of the A.F.A. held its largest meeting of the season when 121 members and guests assembled for dinner at the Fort Armstrong Hotel, Rock Island, Ill. on March 19. National Officers' Night was observed, with National President Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., and Secretary Robert E. Kennedy on hand to give members information of national organization affairs.

Topic for the evening was "Cupola Operation and Control." Technical Chairman H. Bornstein, Deere & Co., Moline, Ill., introduced Waldeck W. Levi, Lynchburg Foundry Co., Lynchburg, Va., who gave a comprehensive review of melting practice in two foundries operated by his company. Importance of maintaining uniformity through close supervision of raw materials was an impressive feature of his talk. Mr. Levi described methods for using scavenging and deoxidizing elements as late additions to ladles. An unusual practice for carbon control involving the use

(*Continued on page* 164)

AT CLEVELAND: *Some of the more than 230 members and guests at the Northeastern Ohio Chapter's March meeting*

Spring tonic

and

VELSICOL
CORE OILS

As a spring tonic sulphur and molasses accomplished no miracles . . . but it served its purpose to generations of Americans in our forefathers' day. Countless medical and biochemical discoveries have long since made this simple remedy obsolete.

Back in the days before the science of metallurgy contributed its findings to the metals industry, simple resin based core oils performed adequately in innumerable foundries Today, however, it is possible to improve upon these oils. To satisfy requirements of the modern foundry which daily confronts problems unknown a few years ago, it is necessary to meet the demands for improved tensile strength, greatly reduced gas evolution, rapid collapsibility, low water absorption, clean shakeout, etc. These, and a host of other specifications, can only be assured by laboratory research and controlled manufacturing processes. VELSICOL'S new and improved core oils based on the synthetic resin of its own manufacture, CORESIN, bring the advantages of a precision tool to foundries pouring all types of metals, ferrous and non-ferrous.

Investigate the merits of these new oils produced from ingredients formulated by leading industrial chemists and in accordance with strict engineering principles. Learn how they can increase production, improve performance,and cut costs. Write us direct or the representative nearest you for samples and complete data.

VELSICOL

VELSICOL Corp.

***General Offices:* 120 East Pearson Street, Chicago • *Plant:* Marshall, Illinois**

The Foundries Materials Company, Coldwater and Detroit, Michigan and Hammond, Indiana; Midwest Foundry Supply Company, Edwardsville, Illinois; H. S. Stoller & Company, Akron, Ohio.

Buehler HAND GRINDERS

for fine grinding of metallurgical specimens

No. 1410

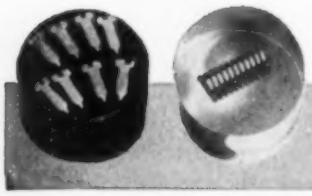
No. 1415
for flat sheets
of abrasive paper

The Buehler Hand Grinder No. 1410 is a most convenient piece of equipment to facilitate the hand grinding of metallurgical specimens. Two grinding surfaces are available for two grades of abrasive paper. When four stages of grinding are desired two No. 1410 grinder units are employed. A drum (7½" diameter) at the head of each grinding surface holds up to 150 feet of abrasive paper that can be quickly drawn into position and clamped firmly for use.

Either wet or dry grinding can be conveniently performed on this grinder. The surface beneath the paper is highly polished heavy black plate glass. Overall dimensions are 15" x 26" x 8"; shipping weight 70 lbs. Polishing surfaces 4" x 12".

No. 1415 grinder accommodates standard size abrasive paper sheets. It serves in a like manner as No. 1410 for the convenient hand grinding of specimens. Overall size 17" x 11" x 3". Shipping weight 30 lbs.

THE BUEHLER LINE OF SPECIMEN PREPARATION EQUIPMENT INCLUDES—
CUT-OFF MACHINES • SPECIMEN MOUNT PRESSES • POWER GRINDERS • EMERY PAPER GRINDERS • HAND GRINDERS • BELT SURFACERS • POLISHERS • POLISHING CLOTHS • POLISHING ABRASIVES



Buehler Ltd.
A PARTNERSHIP

METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

(*Continued from page* 162)

of three kinds of coke aroused much interest. The speaker also gave a clear view of advantages obtained by the balanced blast and moisture control systems as applied to better cupola control.

Chapter chairman R. E. Wilke presided during the evening and announced that a nominating committee had been appointed which includes, C. H. Burgston, chairman, A. D. Matheson, and P. T. Bancroft.—*H. L. Creps, secretary-treasurer.*

Michiana

NATIONAL Officers' Night of the Michiana Chapter of the A.F.A. attracted 110 foundrymen of the area to the meeting held March 6 at the La Salle Hotel, South Bend, Ind. National vice president, Fred J. Walls, International Nickel Co., Detroit, and executive secretary Robert E. Kennedy, were introduced by chapter chairman Victor C. Bruce.

Mr. Walls spoke on the association's plans for the future and also gave some interesting statistics of the A.F.A. Present membership is approximately 7500, with 30 local chapters. He also spoke briefly on the problem of interesting young men in the foundry.

Mr. Kennedy related some interesting historical facts about the association. Of special interest were facts given concerning the many research projects carried on by the association during its 50 years, and at the present time.

Fred Overstreet, Illinois Clay Products Co., Joliet, Ill., was next introduced by the chairman. Mr. Overstreet spoke on causes of scrap in the foundry and stated that in his 35 years of foundry experience it is his observation that the percentage of scrap has not changed materially. Although methods are greatly improved, requirements have become much more exacting. A discussion of gates and risers followed. Several members had brought sample castings presenting difficult pouring and feeding problems, and many good ideas were presented for gating and risering.—*Carl W. Petersen.*

Metropolitan

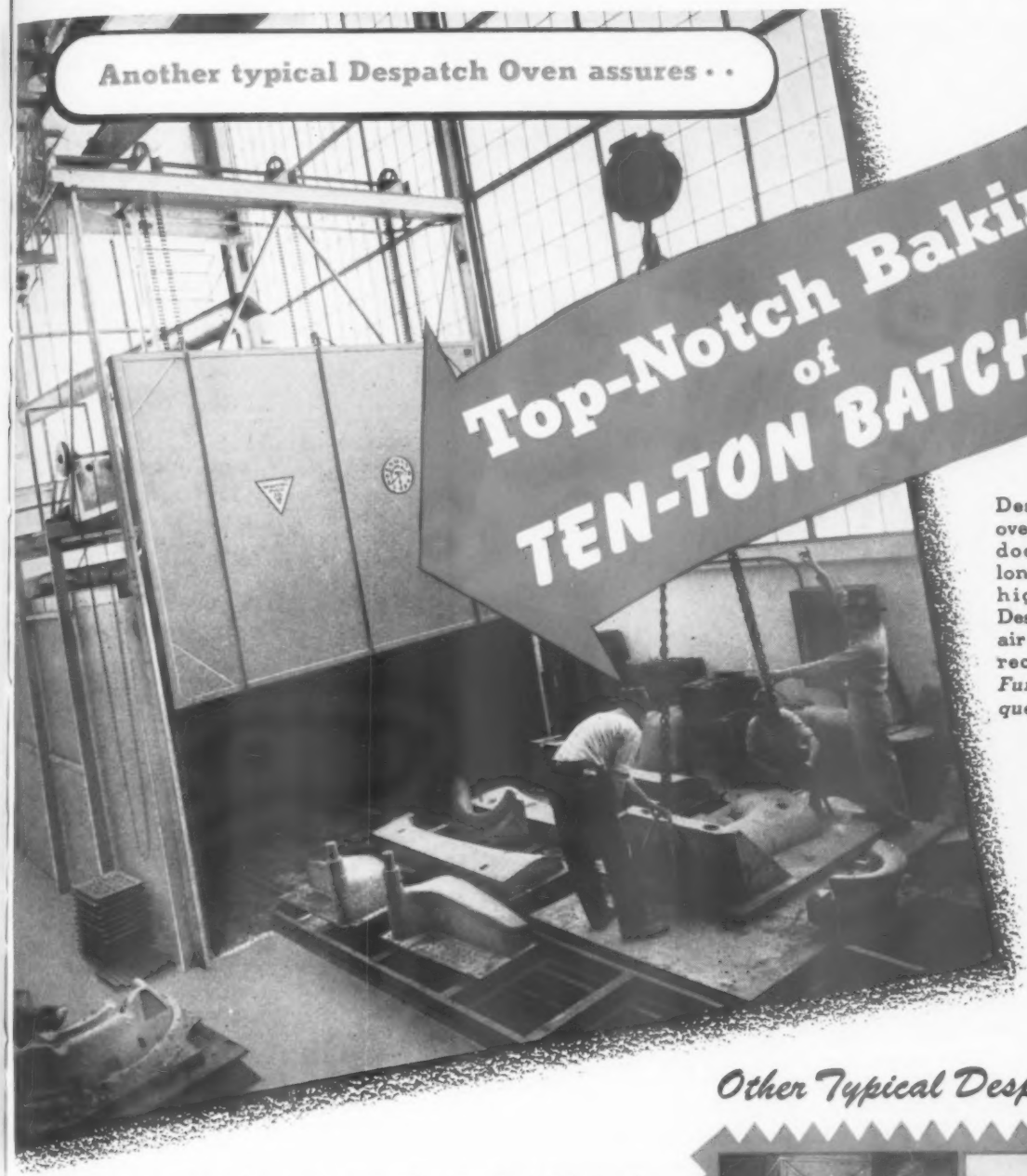
TWO addresses featured the regular monthly meeting of the Metropolitan Chapter, at the Essex House, Newark, N. J., April 2. Jack W. Wheeler, consultant, Reynolds Metals Co., Foundry Division, Springfield, Mass., and connected with Rolls-Royce Ltd., England, discussed the permanent molding of white alloy castings, illustrating his remarks with lantern slides, and touched upon various developments not only in this country but also in England. He came to this country last year with the British Air Commission as a government consultant on permanent molding problems.

The second address was by A. Cris-

(*Continued on page* 166)

Another typical Despatch Oven assures . .

Top-Notch Baking of TEN-TON BATCHES!



Despatch car-loaded oven with vertical lift door. Chamber is 23′ long, 13′ wide and 8′ high. Combination Despatch gas or oil-fired air heater; automatic recording controller. *Further details on request.*

For an oven that gets results, look at this typical example of Despatch foundry-wise engineering! It's a car-loaded oven that bakes 10 tons of big cores or molds per batch—and does the job fast! Ample heat is provided by a Despatch air heater and fan, sized to assure high volume airflow that reaches every spot in the 23-foot chamber. Every core or mold bakes out *right,* fuel consumption (per ton of baked cores) is low, and there are no baking rejects!

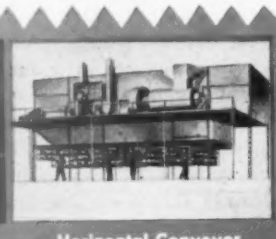
GET RESULTS LIKE THIS in a Despatch-engineered oven that's "foundry-fitted" to your needs. Available in all sizes, all types and for all fuels. Unsurpassed for performance and economy.

Call for a Despatch Engineer today!

DESPATCH OVEN COMPANY MINNEAPOLIS 14 MINNESOTA, U.S.A.

Other Typical Despatch Ovens

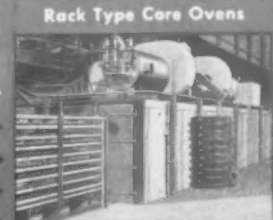
Vertical Conveyor



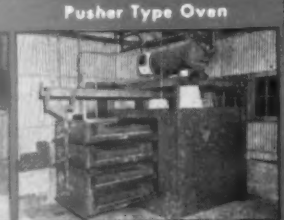
Horizontal Conveyor

Rack Type Core Ovens

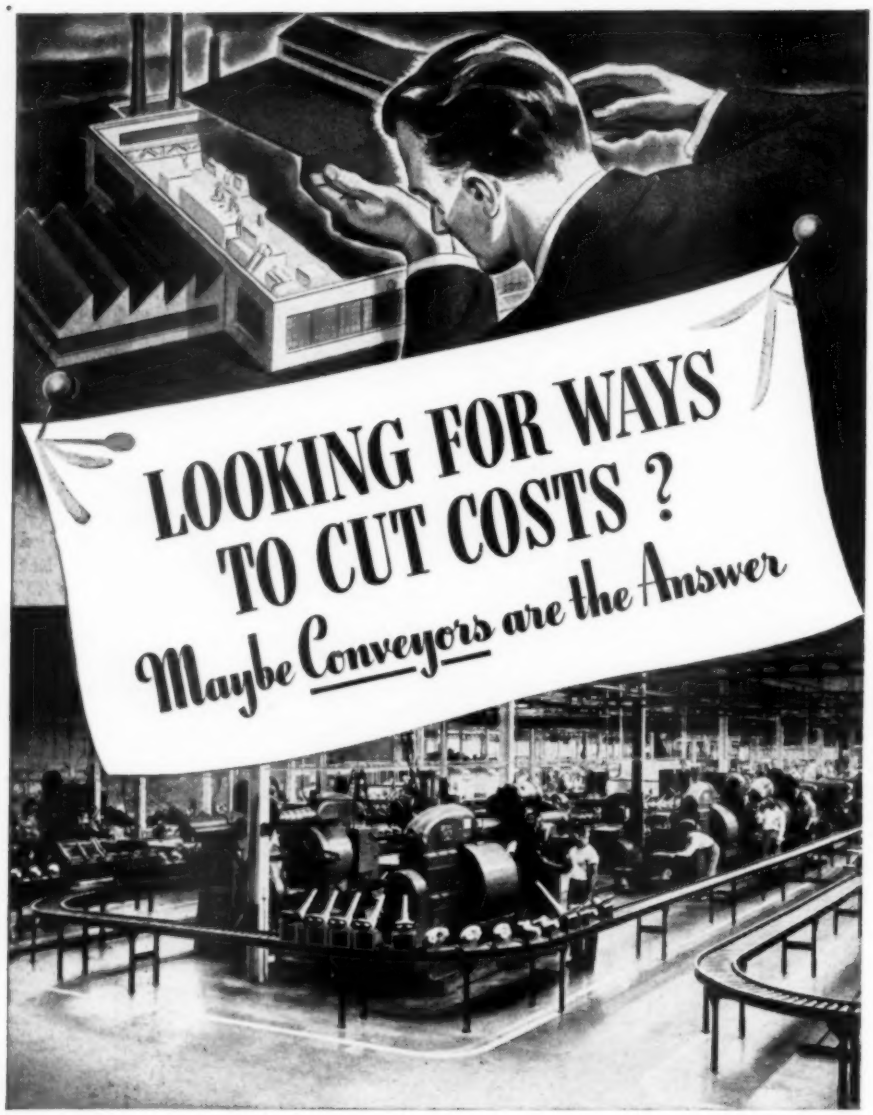
Pusher Type Oven



Intermittent Conveyor



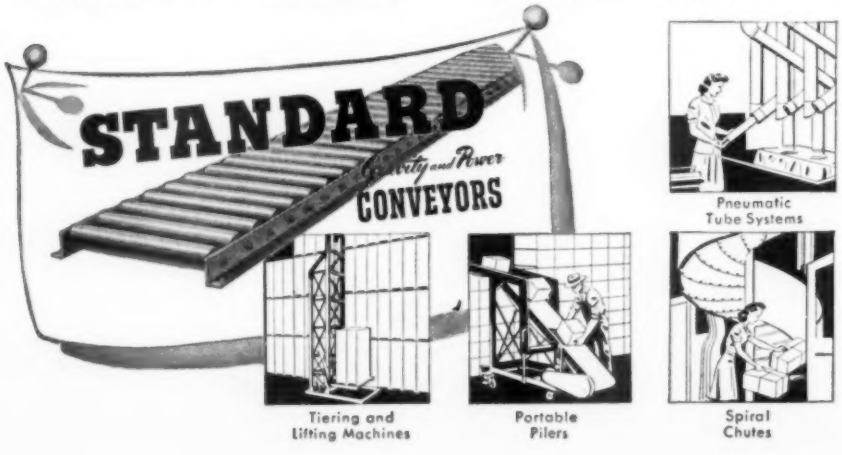
Drawer Type Oven



Conveyors handle a wide variety of commodities—parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. Available in light, average, or heavy-duty types for portable or stationary use, in a wide variety of sizes, styles, and lengths . . . all built by Standard. They give you substantial savings in time and money. Engineers say that material handling constitutes about 22% of manpower cost . . . cut handling costs and you cut production costs.

Standard Conveyor Company has the experience and facilities to recommend and furnish the right type of conveyor for your particular needs. Write for catalog F-55 "Conveyors by Standard" — a reference book that will prove very useful to you.

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities



(*Continued from page 164*)

tello, foundry manager, Bendix Aviation Corp., Teterboro, N. J., who discussed gating, risering and chilling of magnesium sand castings. His paper, presented originally at a meeting of the Magnesium Division, War Production Board, has only recently been released by WPB and was sent by the Metropolitan chapter to the London branch of the Institute of British Foundrymen as an exchange paper. C. Cline, Cooper Alloy Foundry, Elizabeth, N. J., served as technical chairman.—*Ben K. Price.*

Central Indiana

APRIL 2 meeting of Central Indiana Chapter of the A.F.A. was held at the Athenaeum, Indianapolis, with 85 members and guests in attendance. H. K. Nason, director of development, Monsanto Chemical Co., Dayton, O., was speaker of the evening. Bernard P. Mulcahy, research engineer, Citizens' Gas & Coke Utility, was technical chairman.

Illustrating his talk on "Plastics" with slides and samples of parts made by his company, ranging from sections of aircraft propeller blades of impregnated wood to flexible hose and multi-colored plumbing accessories, Mr. Nason explained the various methods of fabrication and the problems encountered in each process. The slides showed curves of tensile strength and elongation at given temperatures of various types of plastics, in comparison with steel, bronze and aluminum alloys.

The following slate for officers and directors of the chapter for the 1945-46 season was announced by committee chairman, Emil G. Schmidt Jr.: Chairman, Ray S. Davis, National Malleable & Steel Castings Co., Indianapolis; vice chairman, J. P. Lentz, International Harvester Co., Indianapolis; treasurer, Harold F. Henniger, International Harvester Co., Indianapolis; secretary, Robert Langsenkamp, the Langsenkamp-Wheeler Brass Works Inc., Indianapolis. New directors were nominated, as follows: H. H. Lurie, Cummins Engine Co., Columbus, Ind.; W. Tragarz, International Harvester Co., Richmond, Ind.; G. C. Dickey, Harrison Steel Castings Co., Attica, Ind.; L. Snyder, Hickman, Williams & Co., Cincinnati.

Emil Schmidt and Harold Lurie were named to the National Nominating Committee of the American Foundrymen's association.

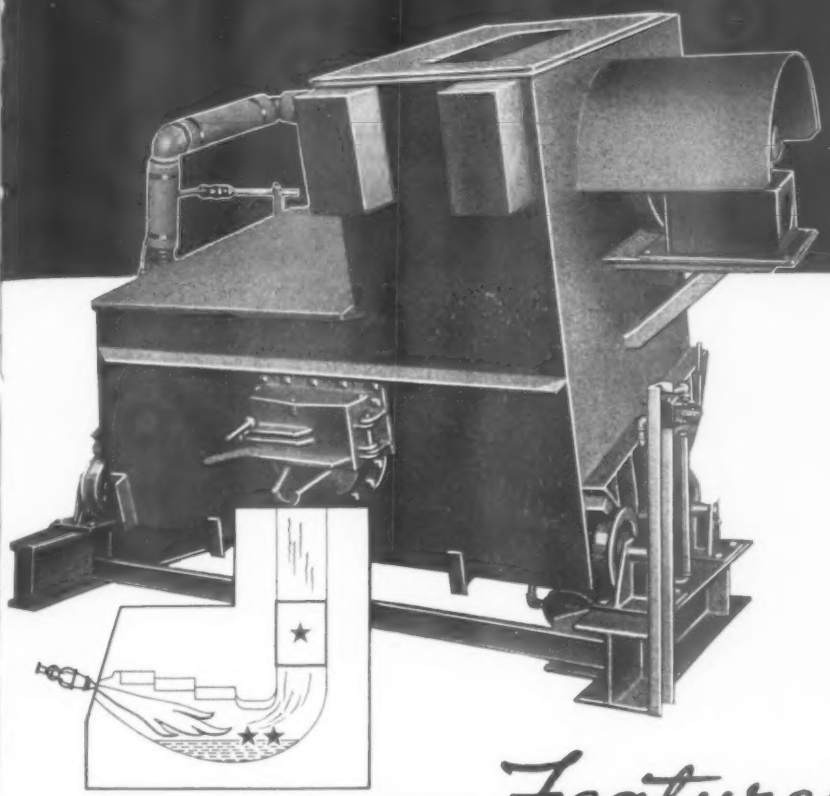
A High School Advisory Committee was named by Chairman Harold Lurie, members of which are Robert Langen, chairman; Emil Schmidt, Ray S. Davis and Bernard Mulcahy. Purpose of the committee is to institute a program for furtherance of interest in the foundry industry among the younger generation by education and propaganda.

A request was made for technical publications and books or magazines to be forwarded to service men at Billing's

(*Continued on page 168*)

Introducing the SKLENAR
IMPROVED REVERBERATORY FURNACE
for MELTING BRASS, COPPER, ALUMINUM and other Alloys

★ ***Extensively used in the British Empire*** ★



Stroman takes great pride in offering to the Foundry Industry The Sklenar Improved Reverberatory Furnace, the latest addition to their great line of non-ferrous metal melting furnaces. Originally designed and introduced in England, Sklenar Furnaces are now in use in many of the leading foundries, railroads, shipyards, and government war plants throughout the British Empire. They are now available in the United States. Some of the many exclusive features that combine to make it the most efficient, fastest melting and most economical furnace of its type are listed below. Read them carefully and investigate their possibilities in your foundry.

Features

SKLENAR FURNACES ARE OF THE NON-CRUCIBLE, DIRECT FIRED IMPROVED REVERBERATORY TYPE.

MELT Brass, Copper, Aluminum, Ferro-Manganese and special cast iron alloys.

★ **METAL IS CHARGED** into a hopper which is also exhaust from combustion chamber.

★★ **FASTEST MELTING**—Metal is preheated and melted in suspension in the hopper. No chilling of hot molten metal by charging cold material into it. Cold metal never reaches the molten bath.

CONTINUOUS CHARGING—It is not necessary to shut off flame to charge additional metal.

GREATEST FUEL ECONOMY is assured as combustion chamber is heated by the same fuel used to melt metal in hopper.

LININGS have longest life.

TILTING MECHANISM—Mechanical and Hand Tilt depending on size of furnace.

EXCEPTIONALLY COOL for operator to work around.

OIL, GAS or **COKE** Fire.

CAPACITIES—From 350 to 10,000 pounds of Brass.

GET COMPLETE INFORMATION ON THIS GREAT FURNACE AT ONCE.
WRITE FOR BULLETIN No. 501 NOW!

STROMAN FURNACE & ENGINEERING CO.
DIVISION OF
THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO 6

40 years of valuable experience can mean the difference between success and failure when it comes to solving the intricate problems of Industrial Dust Control.

Pangborn Corporation has that 40 years of valuable experience and offers its benefits to you for application to *your* problems,—no matter how large or small.

The two installations pictured above show the flexibility of our Dust Control program. The large one is a giant "CH" Collector, doing an efficient, economical job and occupying a minimum of space. In the insert is our new "CK" Unit Collector which was specifically designed to handle small air volume dust requirements of industrial operations. Into both of these collectors have gone the research and knowledge of our 40 years experience.

During these hard-hitting, war production times, the value of Dust Control has been forcibly brought home to a great many alert industrialists. They are thinking in terms of tomorrow as well as today and realize the position of responsibility which Dust Control will occupy on the mammoth production lines of the future.

Come to Pangborn with your dust problems, for today or tomorrow, and receive—as an extra dividend—the benefit of our *40 Years of Valuable Experience.*

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

(*Continued from page* 166)

Hospital, Ft. Harrison, and Wakeman General Hospital, Camp Atterbury, Ind.

Ralph Lee, Grede Foundries, Milwaukee, will be the speaker at the next meeting of the chapter to be held at the Athenaeum, May 7. Mr. Lee's subject will be "Foundry Costs."—*Robert Langsenkamp, secretary.*

New England

REGULAR monthly meetings of the New England Foundrymen's Association were resumed in March with permission from the ODT. The regular business meeting was held at the Engineers' Club, Boston, March 14, with a record attendance of 130 members and guests. Speaker of the evening was Nathan Janco, Centrifugal Casting Machine Co., Tulsa, Okla., whose subject was "Centrifugal Casting."

Mr. Janco, who has long been a proponent of making castings centrifugally, showed a thorough knowledge of this method. He explained in detail the two methods of casting—vertical and horizontal—and outlined the different characteristics of each. The thickness of the casting produced is naturally controlled by the weight of metal allowed to enter the machine.

Directional solidification, from the outside surface toward the inside surface, obtained by the centrifugal process, is the ideal way to pour a casting. When several castings are grouped about a vertical axis, the process is known as centrifuge casting. Permanent or metal molds as well as sand molds are used. Patterns and cores are commonly used in making up the mold. Practically every known metal cast can be poured centrifugally.

The speed of the centrifugal machine is always kept as low as possible, consistent with good castings, in order to save wear and tear on the mechanism. Centrifuge castings are normally run at 600 to 1000 feet per minute peripheral speed. Castings made centrifugally frequently are cheaper to make and give a better yield than with the conventional method. Metal cast centrifugally usually has higher physical properties, including a higher hardness. Mr. Janco had many slides illustrating his talk and showing how castings should be cast centrifugally.—*Merton A. Hosmer, president.*

Central Ohio

CENTRAL Ohio Chapter of the A.F.A. held its monthly meeting Feb. 26 at the Fort Hayes Hotel, Columbus. Following the dinner separate sessions on steel and iron were conducted.

The steel session was addressed by J. B. Caine, Sawbrook Steel Casting Co., Lockland, O. Mr. Caine presented his widely read paper, "Why Heat Treat?" in which he brought out many thought-provoking questions. This paper was timely be-

(*Continued on page* 170)

NOW... cleaner, stronger mold surfaces in two quick easy steps...

WITH NEW TRULINE MOLD SPRAY 91

Now, the makers of Truline Binder* bring you another low cost aid for the production of better steel, iron and non-ferrous castings . . . *Truline Mold Spray 91*. Just spray or brush on green sand molds, ignite and burn it off. Result: a uniformly hard, dry, resin-coated surface which is cleaner, stronger . . . produces cleaner, smoother castings. Time required: only a few minutes from start to finish. Cost: a few cents per mold.

This new Hercules development saves valuable time over old-style torch drying, is more dependable. It eliminates loose sand particles, increases resistance to the washing action of metal entering the mold, minimizes work entailed in getting castings ready for shipment.

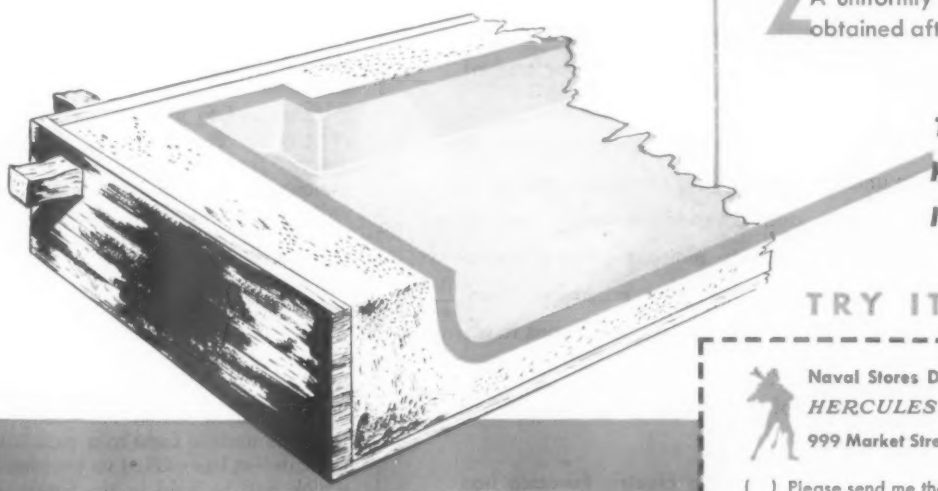
Truline Mold Spray 91 comes ready for use, can be applied on natural or synthetic bonded molding sands. Try it out without charge by returning the coupon.

1 SPRAY IT ON...

The green sand mold surface is covered with enough Truline Mold Spray so that it will burn freely when ignited.

2 BURN IT OFF...

A uniformly strong, dry mold surface is obtained after the solvent has burned off.



THE HARD RESIN FILM KEEPS MOLD SURFACE INTACT...

TRY IT TODAY!

TRULINE *Mold Spray 91*

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
999 Market Street, Wilmington 99, Delaware

( ) Please send me the story on Truline Mold Spray.
( ) Please send sample.

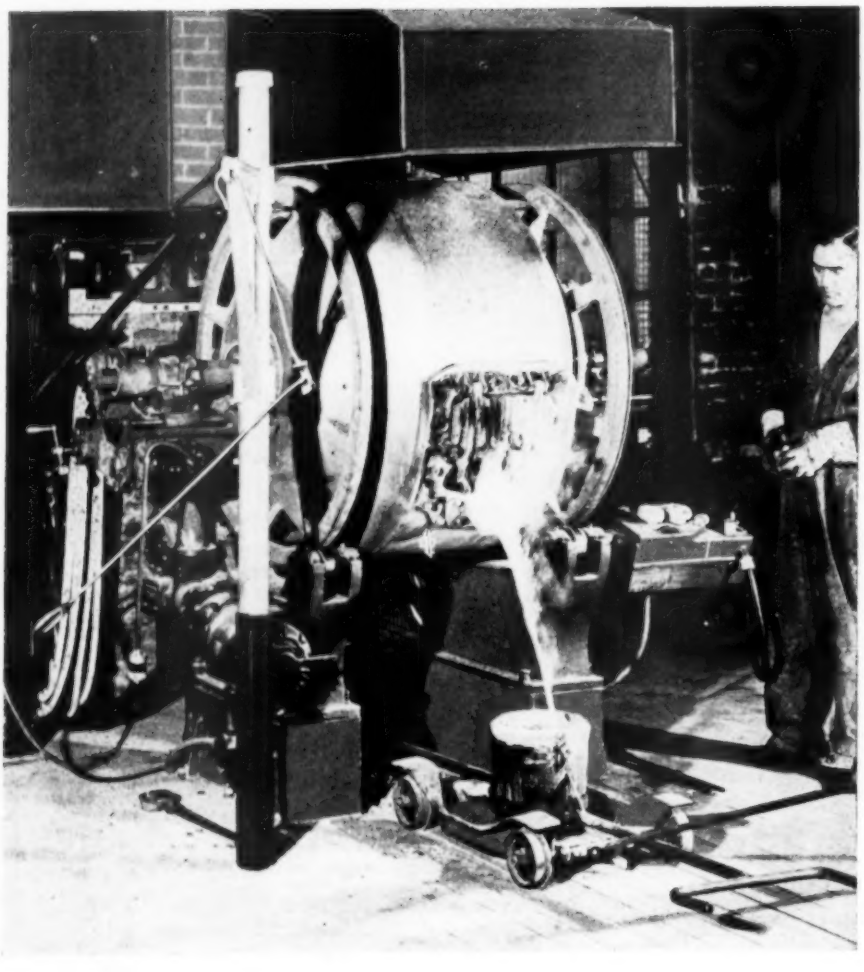
Name.....

Company.....Title.....

Address.....

*Reg. U. S. Pat. Off. by Hercules Powder Co.

NB-52



LITTLE GLUTTON WITH A BIG APPETITE

You're sure of better casting results with a Detroit Rocking Electric Furnace in your foundry. Swift and efficient, these veritable gluttons can produce an amazing volume of metal quickly with little labor and of consistently high quality.

Outstanding engineering and design principles of Detroit Furnaces permit automatic stirring action under non-oxidizing conditions and precise control over time, temperature, and composition—vital melting elements. They eliminate combustion products: melting takes place in a closed chamber, thus reducing dirt and fumes to a minimum. They assure volume production—as many as 8 ferrous or 16 non-ferrous heats in one 8-hour day. They insure lower metal losses, less machine shop scrap, and a higher percentage yield of perfect castings of uniform quality.

Versatile, flexible and fast, the Detroit Rocking Electric Furnace has proved its worth in scores of foundries throughout the country. Available in sizes from 10 lbs. to 4 tons. Write for complete facts.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 168)

cause of the rigid specifications which steel foundries will have to meet with their casting steel in order to continue at a maximum rate of production and to compete with forgings. A lively discussion of the paper followed Mr. Caine's presentation.

The iron session was addressed by Arthur S. Klopf, Firegan Sales Co., Chicago, who presented a preview of the book on casting defects to be published by the A.F.A. The subject was presented in the form of a roundtable discussion, the speaker beginning with a review of the work of the Committee on Casting Defects, which is to analyze causes of defects, to give foundrymen an opportunity to recognize them, and to make his own corrections and decisions.

Numerous slides of casting defects were presented, with discussion by Mr. Klopf and the group. Considerable interest was expressed in the condition causing defects and the means of eliminating them.—*Frank Kiper, secretary.*

Chicago

MEMBERS of the Chicago Chapter, A.F.A., came away from their April 2 meeting at the Chicago Bar Association considerably enlightened on Russia's part in the war and the attitude it is taking in connection with world peace preliminaries. This was the chapter's annual general meeting, and the program committee, with keen appreciation of what has become a leading discussion topic, presented David Nichol, ace foreign correspondent of the *Chicago Daily News*, recently returned after four years covering the war from Germany, Switzerland, Russia and Poland, to speak on "Russia As I See It."

Having spent four years reporting from some of the hottest spots in Europe, Mr. Nichol was able to put Russian war performance and political actions into perspective and to give an accurate picture of existing conditions. He was of the opinion that in the future alignment of nations in Europe Russia will base its judgment on the contribution individual countries made in defeating Germany. Suspicious of the objectives of various powers in the past, Russia will continue in the same attitude in the future until convinced motives are friendly.

Mr. Nichol dispelled the notion that Russia is reverting to a capitalistic form of government, rather has emerged from the communistic form to a socialistic one. Near defeat has unified its peoples, a gain which will be held in the future. In the years to come, an effort will be made to improve the economic level of its citizens and in this American goods will be in good demand. He was certain that Russia recognizes and appreciates American help through lend-lease and other aids, and he fully expects Russia at proper time will participate in defeating Japan.

Chapter President Arthur S. Klopf presided at the meeting, and J. C. Gore,

(*Continued on page* 172)

¶ You can have many of the advantages of Bond Clay and Synthetic Sand even if your only mixing equipment is a hand shovel.

☆ ☆ ☆

¶ Many foundrymen who are not mechanically equipped believe they cannot use bond clay.

¶ There is one bond clay, however,

— DIXIE BOND —

which may be safely used without mechanical mixing.

¶ Dixie Bond gives very high green strength, a soft, flowable sand, excellent finish, less scrap, and easy shake-out. *Write for our descriptive bulletin on the use of Dixie Bond in heap sand.*

Remember, please, that ECP service engineers have *five* different bonding clays and their many combinations from which to give you the one right recommendation and to assure you of receiving the *most bonding strength per dollar.*

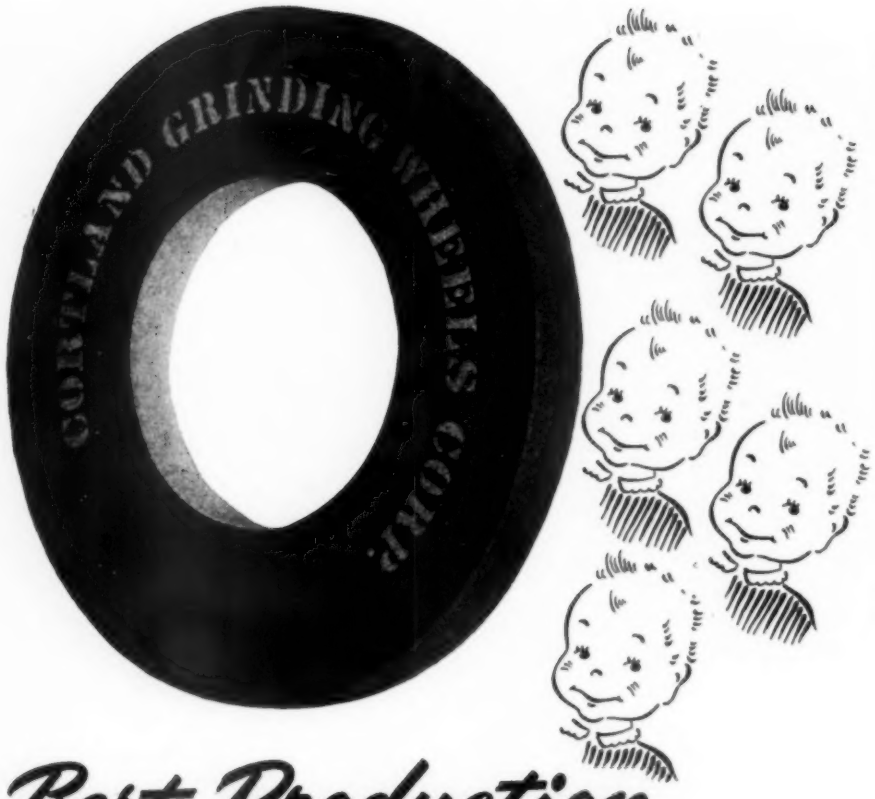
EASTERN CLAY PRODUCTS, INC., EIFORT, OHIO

ECP

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research



Best Production Ever Recorded!

That was the unqualified verdict on Cortland Grinding Wheels, after another decisive War Production Test . . . Snagging operations in a large steel foundry in Pennsylvania were going from bad to worse — until Cortland Wheels were tested competitively against the brand then in use, with the following conclusive results:

WORK: Snagging gates and risers from castings.
Material: Hard, dense steel alloy rolls.
Machine: Fox Grinder, Swing Frame.
Wheel Speed: 8500 SFPM.

RESULTS: Competitive wheels removed gates from an average of 250 rolls. Previous high record had been 350. A Cortland Wheel, Type 1, of exactly the same size, removed 580 gates — "best production ever recorded," our sales engineer was proud to report. As a result, Cortland Wheels were made standard in the foundry.

In the extremely wide range of Cortland's abrasives, bonds, grains and wheel-types there's a combination that will solve every snagging and grinding problem *the one best way* . . . that will do *your* work faster, better and with greatly increased production per wheel.

Our engineers "know the combinations." Call on us any time — without obligation — for a practical, worth-while demonstration of new ways to efficiency and economy.

18

Write to CORTLAND GRINDING WHEELS CORP., 6 Cortland Street, Chester, Massachusetts

For Better Snagging

CORTLAND

(*Continued from page* 170)

chapter vice president and chairman of the program committee, introduced Mr. Nichol and conducted the lengthy discussion period.

Report of the nominating committee proposed the following officers for 1945-46: President, J. C. Gore, Chicago manager, Werner G. Smith Co.; vice chairman, Frank E. Wartgow, manager employes suggestion system, American Steel Foundries, and for the past three years chapter secretary; and secretary, Leslie C. Smith, Chicago district engineer, Peninsular Grinding Wheel Co. The office of treasurer, now occupied by Bruce L. Simpson, president, National Engineering Co., is appointive by the board of directors.

Nominees for directors for three-year terms include: Retiring President Klopf; D. A. Farrell, foundry superintendent, South Works, Carnegie-Illinois Steel Corp.; Cornell G. Mate, assistant superintendent, Greenlee Foundry Co.; and Dr. R. F. Thomson, metallurgist, Dodge Chicago Plant, Division of Chrysler Corp. Election and installation will take place at the May meeting.

Fourth and last in the series of round-tables will provide the program for the May 7 meeting. Topics are as follows: Steel—"Foundry Maintenance"; Gray Iron—"Modern Molding Methods"; Nonferrous—"Magnesium Foundry Control"; Pattern—"Pattern Making Methods"; and Malleable—"Advantages of Mechanization in the Foundry."—*Erle F. Ross.*

Birmingham

BIRMINGHAM District Chapter of the A.F.A. enjoyed a twin-bill in March with a dinner meeting and a technical session on the 3rd and 23rd of the month.

Speaker for the first meeting was H. H. Judson, Gould Pumps Inc., Seneca Falls, N. Y., who gave an interesting talk on "Elimination of Risers in Pouring Heavy Gray Iron Pressure Castings." This is done by melting white iron in one cupola and gray iron in another. The white iron is tapped into a ladle and then inoculated with gray iron, resulting in a low carbon-medium silicon gray iron. The inoculated iron must be poured within ten minutes after inoculation to secure the full benefits of the process. It is poured into very hard rammed molds. When it is found necessary to use risers, they are placed in a position which subsequently will not be a machined pressure-bearing surface. Mr. Judson emphasized that his company is able to meet the most severe pressure test requirements without the use of alloys by their white iron inoculation process.

Norman Hindle, director of the technical development program of the A.F.A., was a guest at a luncheon meeting of the chapter board of directors at the Tutwiler Hotel on March 23. He was also present that evening at the dinner and technical session which was attended by 96 mem-

(*Continued on page* 174)

TOUGH SAWING MADE EASY

DoALL Buttress
THE NEW WIDE-SPACED HARD TOOTH SAW
REG. U. S. PAT. OFF.

ALUMINUM MAGNESIUM *and all* NON-FERROUS METALS

PLASTICS

RUBBER

WOOD

This sensational saw is making history in war plants today and when civilian goods are again in production, many of the new materials will be used and cut with this same saw—the DoALL Buttress, which fits any band sawing machine.

Its special construction — with wider spaced, extra hard teeth — means ample chip clearance, no clogging, longer saw life. The sum total is quicker, smoother straight-line and contour cutting.

NO RE-SHARPENING

The Buttress holds its edge until it's worn out — without re-sharpening. It is then replaced with a brand new band. This means no lost time, no work stoppages.

IMMEDIATE DELIVERY

Various widths and pitches — a proper one for each job. Available at all our supply points.

FREE LABORATORY SERVICE

Saves industry thousands of dollars every month. If you have trouble cutting some material because of hardness, sponginess, brittleness, etc., send us sample. Our research engineers will make dozens of tests until they find the proper saw and speed.

★ ★ ★

Write for literature about the surprising performance of the DoALL Buttress

Contour Sawing

Band Filer

Super Surface Grinders

Grinding Wheels
Magnetic Chucks and Selectron

Colloidal Cutting Oils
and Soluble Oils

Dust Collectors and Coolant Systems

Variable Speed Pulleys
SPEEDMASTER

Band Saws

Band Files

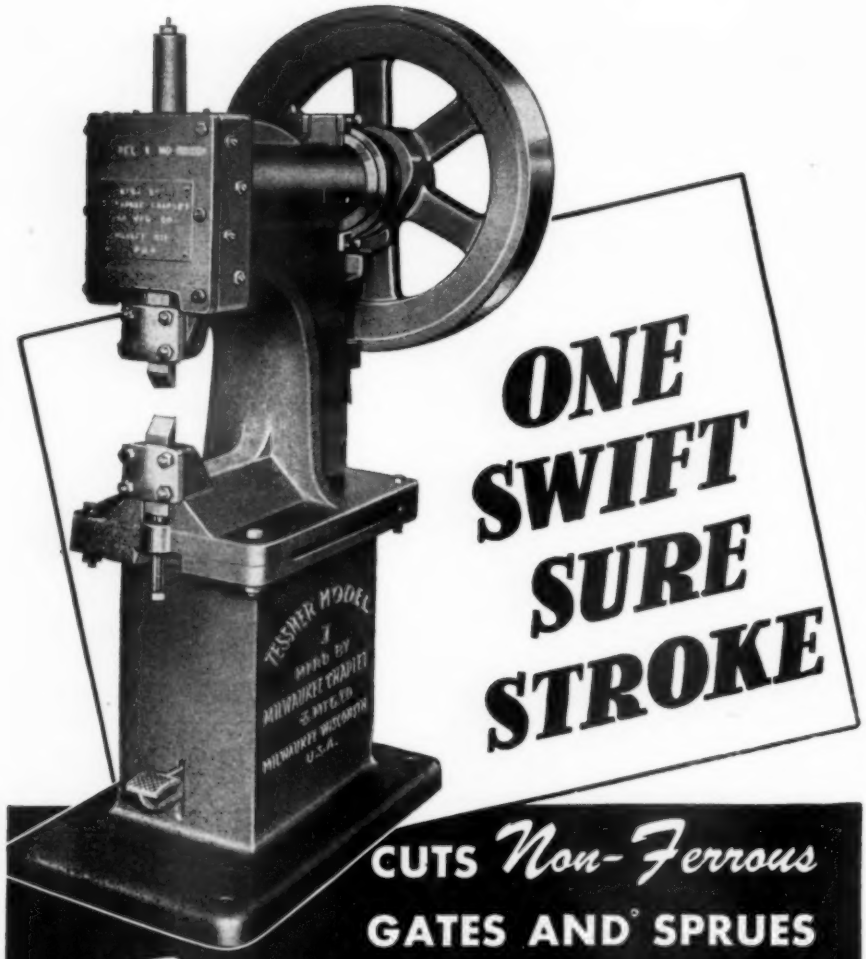
Inspection Laboratory GAGE BLOCKS with Instruments

DoALL

INDUSTRY'S NEW SET OF TOOLS

THE DoALL COMPANY
209 N. Laurel Ave., Des Plaines, Ill.

Sales & Service Offices: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, El Paso, Erie, Grand Rapids, Hartford, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Providence, Reading, Rochester, Rockford, St. Louis, San Francisco, Seattle, Statesville, Syracuse, Toledo, Tulsa.



A Tessmer Sprue Cutter in your cleaning department is the logical answer to one of your most urgent problems . . . *getting out more work with less help!*

It saves man hours and cuts costs because it converts a slow, laborious hand operation into a fast, effortless machine job. It releases valuable man power for more important work.

The Tessmer method of cutting non-ferrous gates and sprues with *One Swift Sure Stroke* results in lower operating costs for two reasons: The machine itself is so sturdy and simple in construction that it requires very little maintenance. No auxiliary dust collecting system is needed to carry off fine metal particles and dust. Write for Descriptive Folder.

Milwaukee
CHAPLET AND MANUFACTURING CO.
1025 S. 40th STREET • MILWAUKEE 4, WIS.

A 4747-2/3

(*Continued from page* 172)

bers and guests.

Dr. James T. MacKenzie, program chairman, introduced Adrian C. Den Breejen, who spoke on "Sand Recovery from Hydraulic Cleaning." The advantages of sand reclamation in material obtained and money saved were outlined. Using colored slides to illustrate his lecture, Mr. Den Breejen showed groups of sand grains, new and reclaimed, explaining that the shape and size of the grains are determined largely by the degree and kind of movement to which they have been subjected by the force of nature.

The speaker pointed out that in some cases reclaimed sand is better than new sand because organic matter and other impurities in new sand are removed in the reclaiming process. "The sand is strengthened by the removal of the weaker grains which could not stand up to the test of the reclamation process," he said.

A committee has been appointed to nominate officers for the coming year. It includes L. N. Shannon, chairman, Lee Roueche, Sr., E. A. Thomas, Alex Murdock and R. R. Deas Jr.

At the directors' meeting Chairman Joe T. Gilbert and Arthur Woody were elected to represent Birmingham on the eligibility list for the nominating committee for the American Foundrymen's Association.—*J. P. McClendon, publicity director.*

Saginaw Valley

TWO hundred Saginaw Valley foundrymen gathered at Fischer Hotel in Frankenmuth, Mich., April 15, to hear Anthony Cristello, Eclipse-Pioneer Division of Bendix Aviation discuss comparative foundry practices in aluminum, magnesium, and bronze.

Mr. Cristello discussed in detail the many factors that must be considered in melting, pouring, gating, molding and core practice. He stressed the importance of attention to details of good practice which collectively mean quality castings.

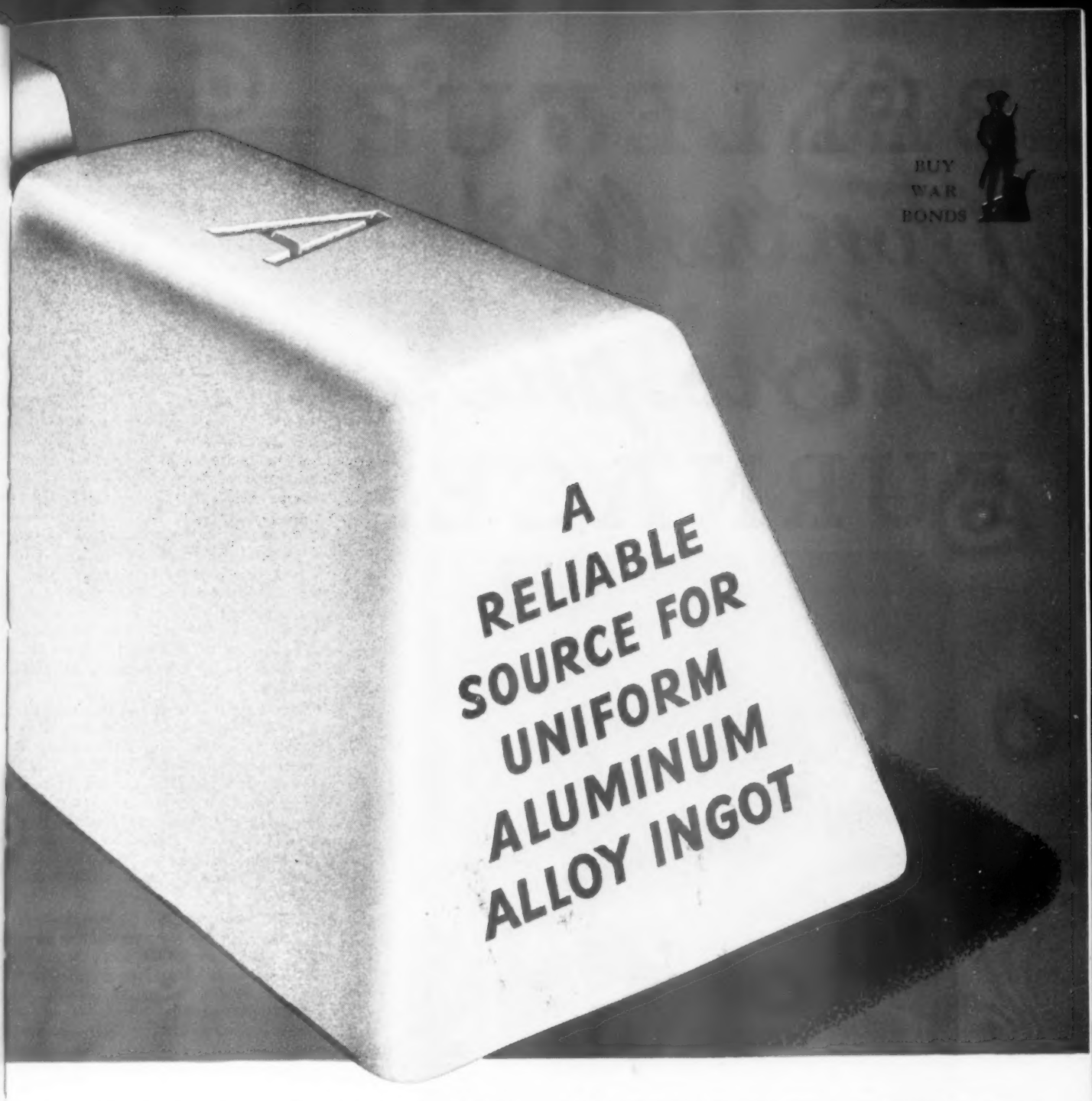
In the past, the speaker pointed out, many castings were produced which had smooth finish and good general appearance, but which would nowadays be considered scrap due to internal defects, cracks, etc. The rigid requirements of the aircraft industry and the good work of the light metals foundrymen in meeting them have had a profound effect on the foundry business in general. Our concepts of good gating practice have changed in the light of findings based on routing X-Ray inspection, magnetic particle inspection, black light inspection, etc.

In closing, Mr. Cristello advised the foundrymen to face the fact that sound, quality castings must continue to be made after the war, despite keen competition, if the foundry industry is to progress with other industries.

The coffee talk was delivered by B. F. Wiand of the F.B.I. of Detroit, who spoke on "Wartime Activities of the F. B. I."

In the business portion of the meeting, an announcement was made that the nominating committee, composed of J. H.

(*Continued on page* 176)



Control aluminum alloy ingot impurities to an extent where they will not later cause trouble in casting, and the biggest single step has been taken to assure perfect castings.

The process of refining, governing every phase in production of Aluminum Refiners ingot, makes certain that these impurities are controlled. Uniformity of quality is thus assured.

ALUMINUM REFINERS

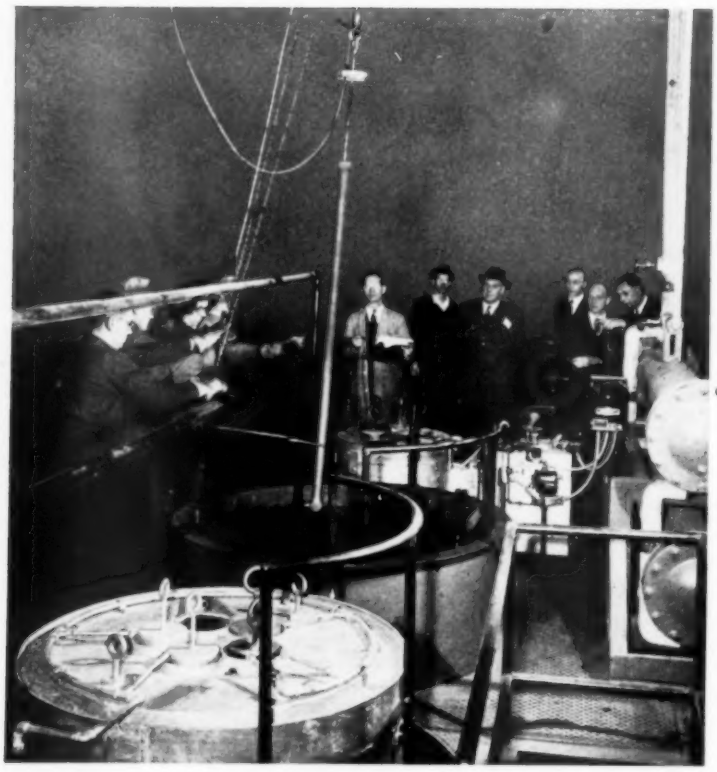
Division of

BOHN ALUMINUM & BRASS CORPORATION • Detroit 26, Michigan

General Offices Lafayette Building

MANUFACTURERS OF ALL TYPES AND SHAPES OF CASTING AND DEOXIDIZING ALLOYS

BELLEVUE *Controlled Atmosphere* FURNACES



In the construction of BELLEVUE "Controlled Atmosphere" FURNACES, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type. The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of BELLEVUES that were "designed" for the job. You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

SEND FOR FULL DETAILS

BELLEVUE
INDUSTRIAL FURNACE CO.
2975 BELLEVUE AVE. DETROIT 7, MICH.

(*Continued from page* 174)

Bernard, A. T. Peters, L. Clark, J. L. Bouchey and A. D. McCaughna, had nominated officers for the coming year. These will be voted on and the names of the new officers announced at the next and final meeting of the season on May 3.

James H. Smith, general manager of the Saginaw Malleable Iron Division, will be the main speaker at the May meeting. His topic will be "Progress with Better Methods and Motion Study."—*Joseph J. Clark, reporter.*

Twin City

TWIN CITY Chapter of the A.F.A. met at the Curtis Hotel, Minneapolis, March 28, for the seventh regular meeting of the season. One hundred twenty members and guests heard W. B. George, chief metallurgist and foundry engineer for Lavin & Sons Inc., Chicago, in an authoritative discussion of "Brass and Bronze Castings."

A motion picture showing the operation of speedslingers and sandslingers was arranged by the Foundry Supply Company, St. Paul. H. G. Schlichter, sales manager of Beardsley & Piper Co., discussed the film and answered questions.

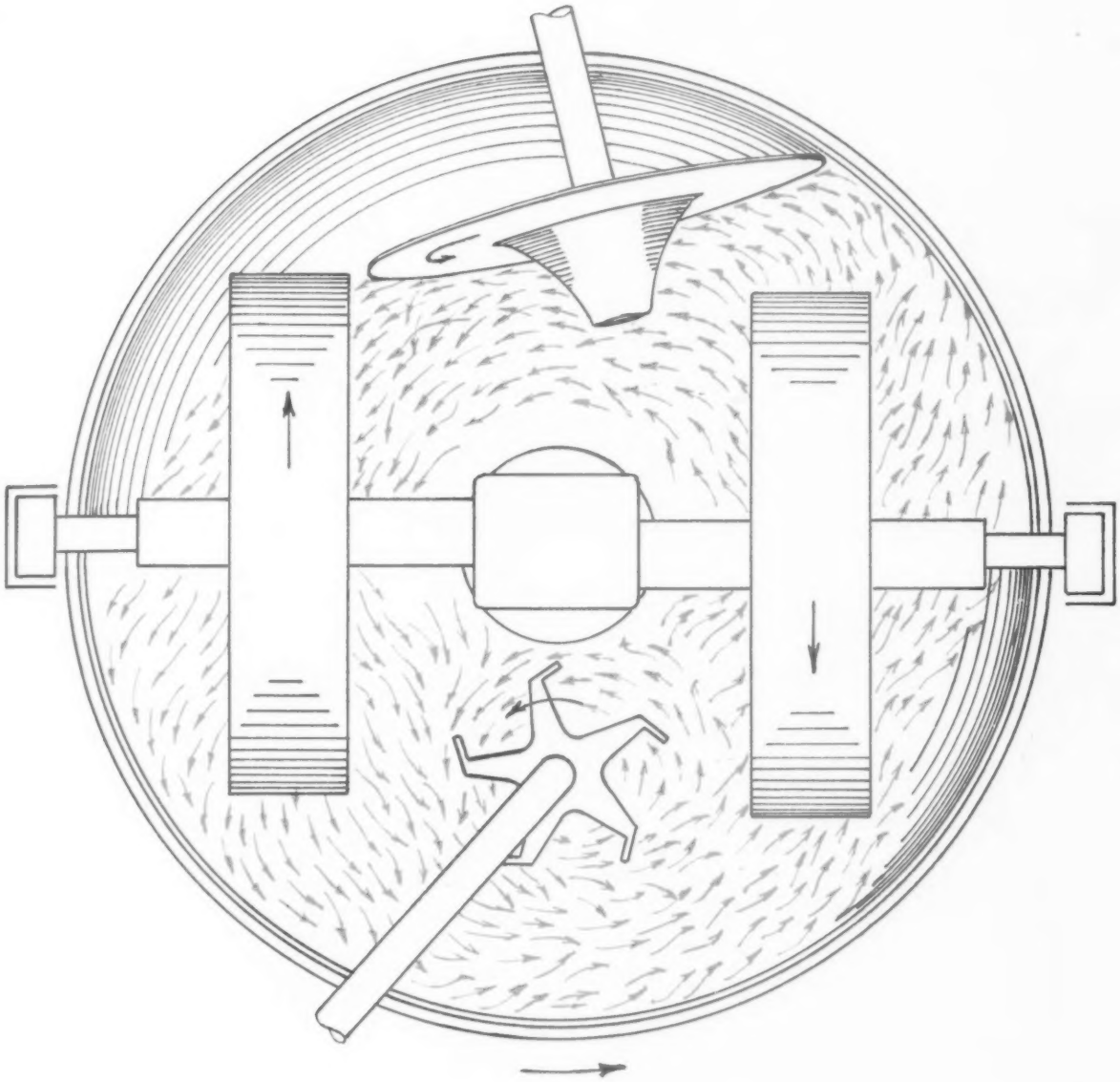
Drawing for door prizes was conducted by C. T. Booth of Minneapolis Electric Steel Castings Co. Two cartons of cigarettes and a bottle alleged to contain core oil were supplied by the Chicago Retort & Firebrick Co. Prize winners were Max von Domarus, Northern Ordnance Co.; Lyle Soderholm, Minneapolis Electric Steel Castings Co.; and Walter Wahrman, Northern Malleable Iron Co.

A. A. Gustafson, E. F. Houghton & Co., reporting for the membership committee, announced that since May 25, 1944, the Twin City Chapter has added one sustaining member, 16 personal or affiliate memberships were changed to company memberships, affiliate memberships increased by 62, and there were 9 new personal and associate members. At present the chapter consists of 3 sustaining members, 41 company members, 88 affiliate members, 32 personal and associate members, and 7 student members.

Mr. George began his talk with a discussion of costs. Stating that the same casting is being made in a number of foundries with the price ranging from 28 cents a pound to almost twice as much, he emphasized the lack of valid cost information among foundry operators, a situation general throughout the industry. Know your costs, or fail; profits of the present era will not exist in the postwar period, warned Mr. George.

The practice of bidding low merely to get the job without regard for cost has led many large manufacturers to let out non-ferrous castings to smaller foundries, because they can purchase castings cheaper than they can make them.

(*Continued on page* 178)



WHAT THE SAND THINKS ABOUT IT

1st Sand Grain: Where were you when the cyclone hit us?

2nd Sand Grain: I was peacefully minding my own business in the storage bin when, whoosh, I got thrown into the Clearfield Mixer, and boy what a ride that was! Talk about perpetual motion!

1st Sand Grain: Makes you feel fine though, doesn't it? Here we are all bonded up and ready to go.

2nd Sand Grain: I bet the boss will like the castings we turn out for him today.

May we send your copy of the Clearfield Mixer Catalog?

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

MODEL 4000 — for wall type indicator or recorder. Has flexible arm adjustable to any angle without use of tools

For Instantly and Accurately Checking the Temperature of all Nonferrous Molten Metals

Everyday, an increasing number of foundries are adopting the more efficient *Elematic Thermocouples*. Not only because they give such dependable temperature control, but because they are more economical.

All Elematic Thermocouples are equipped with our own, exclusive *Metalast Protection Tubes*— long life tubes which can be easily replaced without damaging or discarding the thermocouple, and at a saving of time and labor.

Made of a special heat resisting alloy, in types for both furnace and ladle use, Elematic Thermocouples with Metalast Protection Tubes have been tested and approved by scores of the largest brass and copper foundries in America.

Write For Our Latest Bulletin No. 500

DOUBLE THE LIFE OF YOUR THERMOCOUPLES WITH THIS REPLACEABLE METALAST TUBE

Simple to attach . . . fully protects thermocouple from slag or molten metal . . . drilled from solid special alloy stock without welds or seams. Available in 6" or 8" lengths with ½" pipe thread.

ELEMATIC EQUIPMENT CORP.

6046 WENTWORTH AVENUE, CHICAGO 21, ILLINOIS

(*Continued from page* 176)

The old bit of philosophy, let the buyer beware, is reversed for the foundryman to beware the chiseling buyer. Foundries have been forced out of business as a result of this practice.

So that an order will be placed with a foundry deserving it, i.e., that can make the castings for a reasonable cost at a reasonable profit, Mr. George recommended a basic cost system. The system was explained briefly and illustrated by three examples of nonferrous castings. Overhead, which is to include material costs (except metal) was placed at 150 per cent of labor costs, because on any job someone is going to bid on the basis of that figure. Hazard, a new cost factor that caused much debate, was a percentage of combined labor and overhead based on scrap possibilities, test bar requirements, loss of first few castings, and special tests to be met.

In the examples, hazard ran from 5 per cent on bushings and bar stock to 200 per cent on an 800-pound injector body which had to pass a pressure tightness test. Metal cost included a 10 per cent allowance for loss due to several remeltings. 20 per cent profit was allowed. Contrary to common practice, but in accord with desirable sales technique, the speaker advised selling castings by the piece instead of by the pound.

Melt in Crucible Furnace

Taking up the operational details of nonferrous founding, Mr. George sketched a crucible-type furnace and described efficient melting practice. For maximum heat utilization, top clearance should be ⅜-inch, bulge clearance 1¾ inch (just enough to accommodate a well-fitted tongs). The flame should start below the base of the crucible so that overheating of the top, which is the last to hold the metal, is avoided. A good crucible should glaze over on the first heat and last for 100 heats if not pushed too hard.

A melting rate of a crucible-full per hour was suggested. In charging, the metal should not be allowed to get above the plastic state until the crucible is full to within ½-inch of the top. In reply to a question from the floor, Mr. George stated that he had seen crucibles with a solid heel of metal crack when reheated but that a crucible full of solid metal would not crack because of uniformity of heating and expansion.

After pouring, the crucible should be allowed to cool in the furnace. Efficiency is increased by about 10 per cent if the clean-out hole is kept closed with a piece of broken crucible that may be punctured readily with a bar should the crucible crack during melting. A flame about 6 to 8 inches high should issue from the furnace top, and an oxidizing atmosphere (0.3 per cent oxygen) should be used. For gas analyses a porcelain tube or water-cooled metal tube is required, and the sample should

(*Continued on page* 182)

Amazingly Improved Cupola Results --

..with Famous CORNELL CUPOLA FLUX

Advantages of SCORED BRICK FORM

Takes less than a minute to use, saving time and labor.

Promotes accurate measurement—correct quantity of flux per charge. You simply toss in a brick to each ton or break off a briquette (quarter section) for each 500 pounds of iron.

It does not blow out with the blast but stays in the melting zone until completely consumed.

When you charge your cupola add a little Famous Cornell Cupola Flux and see the difference in your cupola results.

Heats are shortened. Iron comes clean and is more fluid, resulting in denser grained, stronger, cleaner and more machinable castings.

And your cupolas require less attention. They are kept clean and the flux coating or glazing over the lining prolongs life of brick in melting zone and gives cupola a cleaner drop.

Inspect your castings, then try Famous Cornell Cupola Flux on your next lot—and inspect again! Enough said, you will become another enthusiastic customer.

Write for Bulletin

The CLEVELAND FLUX Company

1026-1036 MAIN AVENUE, CLEVELAND 13, O.

Manufacturers of Iron, Brass and Aluminum Fluxes, Since 1917

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins ➡

Famous CORNELL ALUMINUM FLUX	Famous CORNELL BRASS FLUX	Famous CORNELL LADLE FLUX
Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.	Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.	Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

Rapid cooling and fast mulling, both done simultaneously, was a tough assignment! But not for the Speedmullor! Of these two No. 70 Models with air-cooling, Mr. Kuniansky, Vice President and General Manager of Lynchburg Foundry, says: "They have worked out to our complete satisfaction, giving us a cool sand and very rapid mulling with the correct properties."

Compare Speedmullor mulled sand with sand produced by other mixers—see and feel the difference! Uniformity and fast mulling—every batch, every time!

HOW HOT SAND IS COOLED AND RAPIDLY MULLED IN ONE OPERATION BY LYNCHBURG FOUNDRY.....

BEARDSLEY & PIPER COMPANY

THE BEARDSLEY & PIPER COMPANY

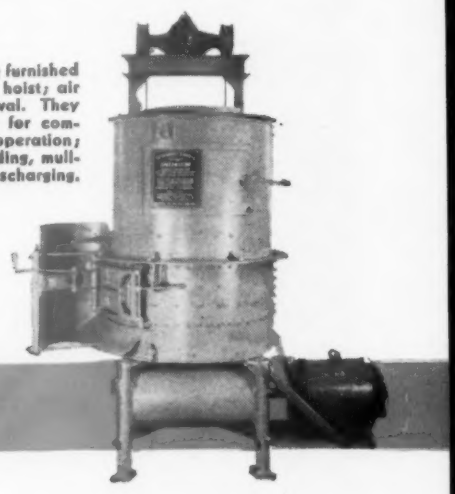
2541 NORTH KEELER AVENUE — CHICAGO 39, ILLINOIS

THE Lynchburg Foundry Company, Lynchburg, Virginia, recently faced a tough sand cooling and mulling problem that is common to many foundries. Two No. 70 Speedmullors solved this problem in a hurry! Now, with this modern equipment, they are quickly cooling hot sand to within 5° of room temperature and thoroughly mulling in 2 minute cycles over 40 tons per hour to their exact requirements. This mulling cycle is many times faster than ever before, but according to Mr. H. K. McGavock, assistant to the Vice President and General Manager, 60 tons per hour could be mulled if required. Speedmullors have many proven records like this!

Speedmullors prepare the highest quality facing, backing and core sand obtainable. They are faster, more economical per ton of mixed sand, far superior to ordinary mixers. They reduce scrap losses and cleaning costs . . . make amazing savings in core oils because of more uniform mulling and even distribution. Rubber-tired wheels knead, squeeze, toss and aerate sand against rubber-lined walls, protecting sand grains from crushing. Investigate the Speedmullor for your foundry. Write for catalog!

THERE'S A SPEEDMULLOR
TO FIT EVERY FOUNDRY'S NEEDS!

Speedmullors can be furnished with or without skip hoist; air cooling; fines removal. They are also available for completely automatic operation; batch weighing, loading, mulling, cooling, and discharging.



.....THE *Speedmullor!*

THE BEARDSLEY & PIPER COMPANY ARE MANUFACTURERS OF SANDSLINGERS, SPEEDSLINGERS, SPEEDMULLORS, SCREENARATORS, MULBAROS, SHAKE-OUTS, SAND CONDITIONING MACHINES, GYRATORY SCREENS

"SHOW ME"...
THE AMAZING MULBARO!

Just say "Show Me", and we show you how the versatile new Mulbaro operates. A demonstration will be made in your foundry—without inconvenience or obligation to you.

Small, medium and large size foundries find the Mulbaro excellent for mulling special small batches or for all-purpose mulling.

Mulbaro is comprised of two sections . . . top section contains mulling mechanism which lowers down onto mulling barrow containing sand to be mulled. Portable . . . versatile . . . low-cost, efficient mulling . . . *that's* the Mulbaro!

Challenge us to a demonstration in your own foundry. Just write and say "Show Me"!

*All Prices F. O. B. Chicago

THE BEARDSLEY & PIPER COMPANY

2540 North Keeler Avenue Chicago 39, Illinois

THE BEARDSLEY & PIPER COMPANY ARE MANUFACTURERS OF SPEED-SLINGERS, SPEEDMULLORS, SANDSLINGERS, SCREENARATORS, MULBAROS, SHAKE-OUTS, SAND CONDITIONING MACHINES, GYRATORY SCREENS

(*Continued from page* 178)

be taken at the level of the crucible top.

The speaker described an interesting application of the simple bit of knowledge that manganese bronze is hot-short between 725 and 750 degrees Fahr. Tough as taffy above and below the temperatures, gates and risers can be knocked off if the casting is caught in this range after pouring; or a furnace load of castings can be heated into the hot-short range after the shakeout. A Washburn core with the hole diameter one-fourth of the riser diameter can be used to advantage on the risers. The hot-short temperature interval is shown by a characteristic pink color of the metal or by the use of a temperature indicating crayon.

An excellent description of shrinkage phenomena led to a discussion of pouring temperatures, risering and directional solidification. Blind risers were recommended for many applications, but it is not necessary to use a core to admit atmosphere as is customary in steel foundries, Mr. George said. Shape and section size influence the amount of contraction to an important degree as shown by tubular castings which shrink more along the cylinder axis than across the diameter. Mr. George recalled a casting in which this was not taken into account and, as a result, the bore would not clean up in machining.

Cement bonded 70-mesh sand or a completely dried mold were suggested for heavy castings. To vent chills, drill ¾-inch holes, pack with core sand, and bake. Direct contact with the metal is avoided by wiping the face of the chill with core oil and sprinkling with sand before baking.—*Herbert F. Scobie, program chairman.*

Detroit

DETROIT Chapter of the A.F.A. met March 15 at the Rackham Educational Memorial. Following the dinner a war film, "Return to Guam," was shown which was documentary evidence of how island after island was taken from the Japanese.

Chairman R. G. McElwee introduced the speaker, L. A. Danse, General Motors Corp., whose subject was "Inspection Problems in Castings Production." Mr. Danse was assisted in his discussion by H. J. Havermail, General Motors Truck, S. A. Klapp, Detroit Transmission, and A. A. Weideman, Detroit Diesel. These men are chief inspectors of plants using large quantities of castings purchased in the competitive field.

Each of the speakers covered separate problems encountered in foundries engaged in supplying castings. The main requirements are physical specifications, freedom from chill and hard areas, dimensional accuracy, target locations, and control of product. Contact between foundry, engineering department, inspection and purchasing were emphasized as

(*Continued on page* 184)

Specify "NORTON RESINOID"

For Steel Castings and Annealed Malleable Iron

A123-P4B5

That's a popular Norton Resinoid Wheel on swing frame grinders when pressure and contact are medium. Light pressure or large contact would call for softer wheels—such as A123-04B5. Heavy pressure and small contact would need harder wheels—A123-R4B2L for example. Gray iron and unannealed malleable castings call for a Crystolon wheel—such as 37C14-Q4B.

A Norton abrasive engineer will be glad to study your cleaning room jobs and specify just the right wheels to meet your special conditions.

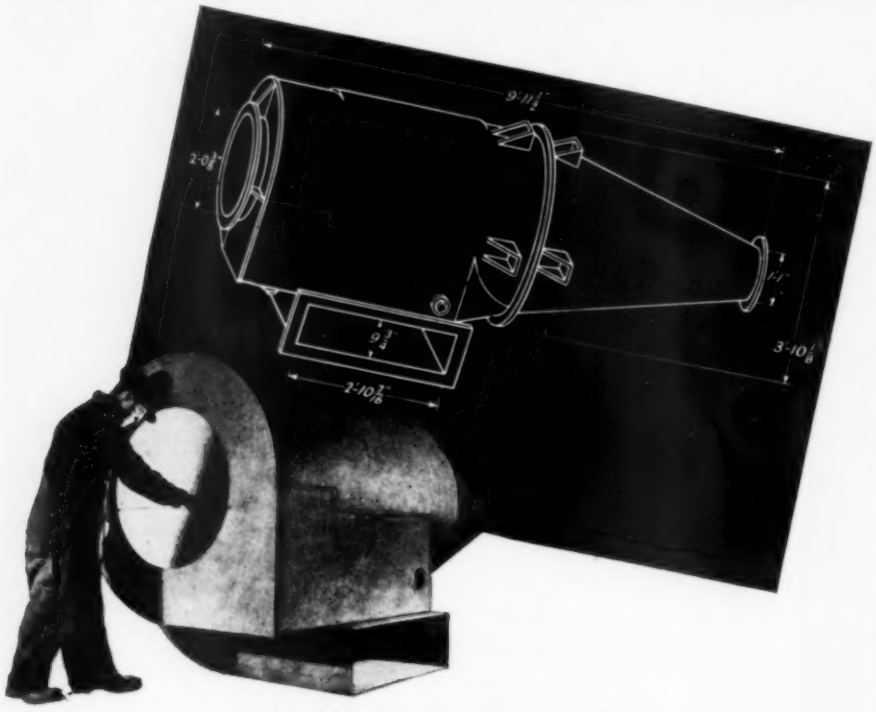
NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

W-1003

NORTON ABRASIVES

LARGE DIAMETERS



Buell's assurance of
HIGH EFFICIENCY, LOW MAINTENANCE, LONG LIFE

THE DECIDED ADVANTAGES of Buell's large diameter cyclones, made possible by the patented "Shave-Off", definitely reflect industry's growing preference for Buell (van Tongeren) Dust Recovery Systems.

Large diameters make possible a collection operation with low centrifugal force and permit construction of extra thick steel. This accomplishes two things: minimum abrasion and long life. *Large diameters* afford large dust outlets, making clogging practically nil. *Large diameter* cyclones have the added advantage of handling a given gas volume with fewer units.

Engineers who look to low cost up-keep and continuous operation as prime requisites in dust recovery should give these factors serious consideration.

BUELL FEATURES

SHAVE-OFF
LARGE DIAMETERS
EXTRA-STURDY CONSTRUCTION
CORRECT HOPPER DESIGN
SPLIT-DUCT MANIFOLDS
INNER WELDS GROUND SMOOTH

RESULT IN

HIGH COLLECTION EFFICIENCY
LESS FAN BLADE WEAR
LOW DRAFT LOSS
LOW POWER CONSUMPTION
HIGH TEMPERATURE RESISTANCE
UNLIMITED CAPACITY
NO MOVING PARTS
FREE DUST FLOW

PRODUCE

HIGH EFFICIENCY
LOW MAINTENANCE
LOW OPERATING COST
LONG LIFE
NO CLOGGING

buell
DUST RECOVERY SYSTEMS

Engineers and plant executives are invited to write for Buell's factual 28-page book:-
"The van Tongeren System of Industrial Dust Recovery"

BUELL ENGINEERING COMPANY, INC.
14 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

(*Continued from page* 182)

being important means of control. Following the presentation a number of interesting comments on the subject were made by both foundrymen and inspectors present.

Nominations for officers and directors for 1945-46, subject to election at the May 17 meeting, are as follows: Chairman, E. C. Hoenicke, general manager, Eaton Mfg. Co.; vice chairman, A. H. Allen, THE FOUNDRY; treasurer, W. W. Bowring, Frederic B. Stevens, Inc.; secretary, H. H. Wilder, Vanadium Corp. of America; directors for 3 years: R. G. McElwee, Vanadium Corp. of America; G. Vennerholm, Ford Motor Co.; G. A. Fuller, Federal Foundry Supply Co.; J. P. Carrittee Jr., True Alloys Inc. G. L. Galmish, Michigan Malleable Iron Co., has been nominated for a 2-year term to succeed M. E. Brooks, Dow Chemical Co., now a member of the Saginaw Valley Chapter.—*H. H. Wilder, reporter.*

Reading

FOUNDRY practices and techniques developed to produce armor steel, housings for aircraft superchargers and other war equipment were explained to members of the Reading Foundrymen's Association at a meeting held March 20 at the Berkshire Hotel, Reading. William G. Reichert, president, W. G. Reichert Engineering Co., Newark, N. J., and authority on foundry practice, was the speaker.

At the Feb. 20 meeting held at the Berkshire Hotel, Grafton M. Thrasher, service engineer, R. Lavin & Sons Inc., Chicago, discussed "Brass and Bronze Under the Microscope." Mr. Thrasher illustrated his talk with color slides.—*W. I. Cassidy, secretary.*

Susquehanna Valley

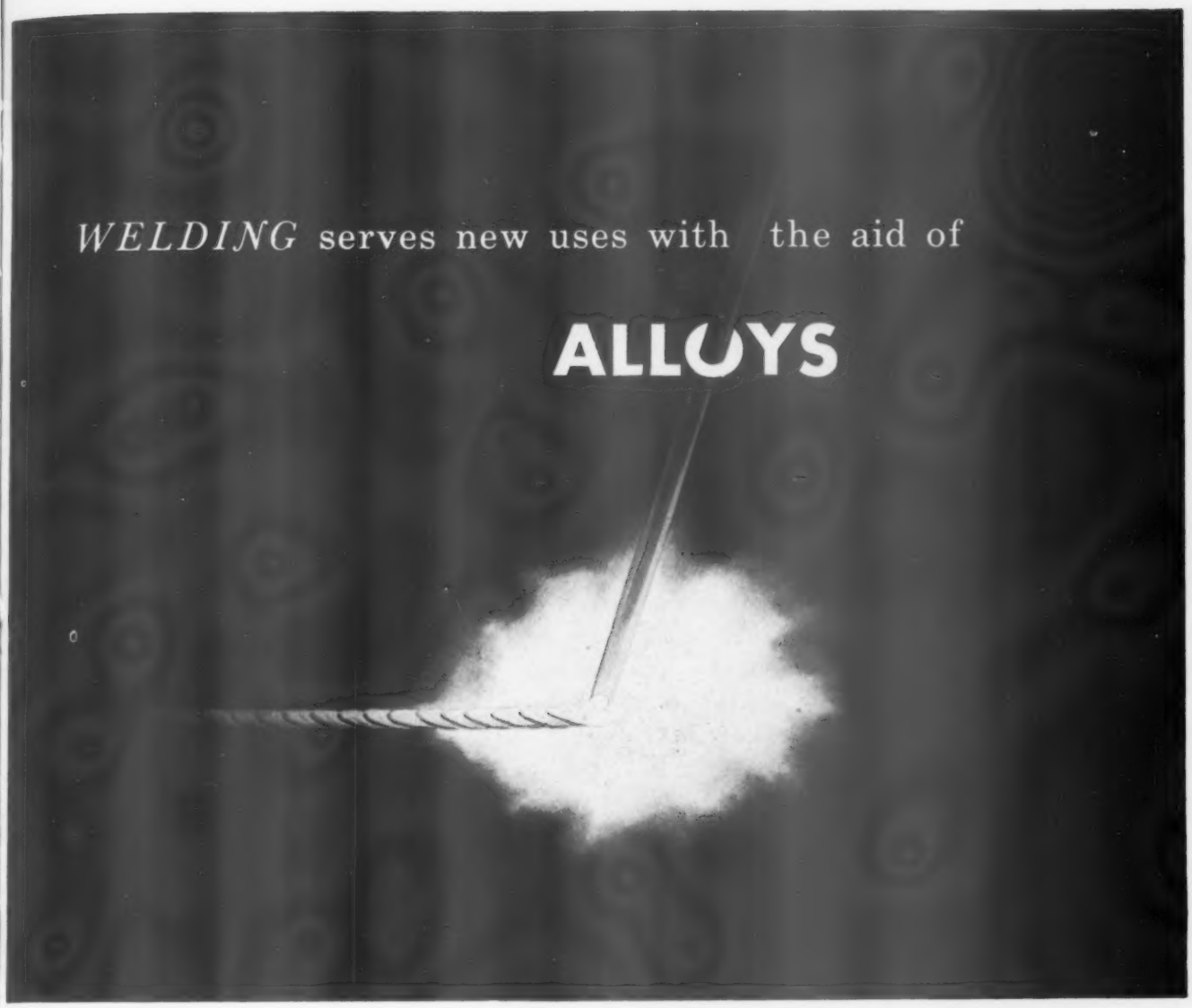
OVER 50 members and guests were present at the March 28 meeting of the Susquehanna Valley Foundrymen's Association at Williamsport, Pa. Tom E. Barlow, Battelle Memorial Institute, Columbus, O., was the principal speaker and his subject was "Practical Cupola Operation."

Mr. Barlow presented a very interesting and enlightening talk and the subsequent open discussion was the best ever held at any of the meetings, nearly every person present taking an active part.—*Clarence Reidler, president.*

Northern California

EXACTLY 139 members and friends of the Northern California Chapter, A.F.A. journeyed to the Claremont Hotel, Berkeley, for a dinner that was scheduled for 125. Those who were unable to be served with the group made other arrangements in good spirit, and returned to a crowded room to hear a coffee talk

(*Continued on page* 186)

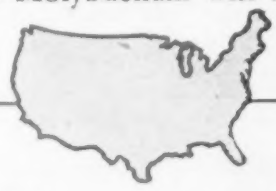


Alloys incorporated either in the coating or in the rod itself—either for their effect on fluxing or to make the weld stronger,—have contributed greatly to enlarge the usefulness of welding since the war began.

The alloys thus employed vary not only with the composition of the body metal but with the kind of welds to be made, the conditions under which they must be made, and the welding equipment in use. Minute discrimination may make the difference between success and failure. A considerable body of precise knowledge on the subject has been built up.

The Molybdenum Corporation has for years been a large supplier of alloys, metal powders, and chemicals for the welding rod manufacturer and is often consulted as to materials and methods.

An inquiry concerning any use of Boron, Tungsten, or Molybdenum will be welcomed.



AMERICAN Production, American Distribution,
American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.
Works: Washington, Pa.; York, Pa.
Mines: Questa, N. M.; Yucca, Ariz.; Urad, Colo.

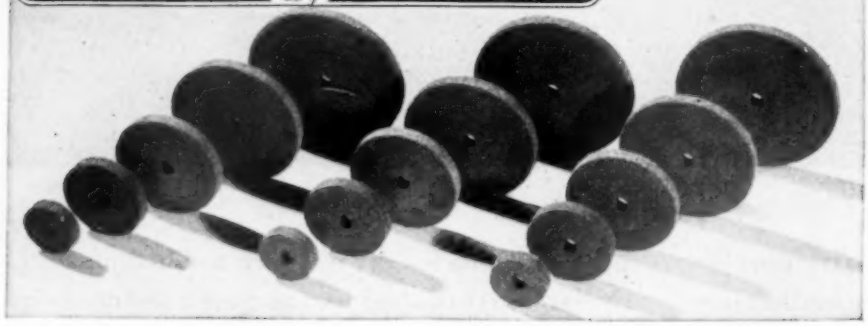
MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

The widest range of types, abrasives and bonds—wheels to do any job of grinding so accurately the finish can be measured in micro inches—rubber wheels for polishing or precision cut-off work.

You get the results of half a century of invention, tests and improvements from our modern research laboratory. And, this same laboratory is open to you—tell us about any grinding problem you have and our engineers will tell you how best to whip it.

CHICAGO GRINDING WHEELS AND MOUNTED WHEELS



Whether you turn out fighting equipment for Uncle Sam or are re-tooling for peace-time production, you'll find Chicago Wheels just what you've been looking for to produce better, smoother finishes.

GRINDING WHEELS up to 3" in diameter in various bonds, including the new FV, the bond with a pedigree.

MOUNTED WHEELS in every practical shape, grain and grade, each firmly mounted on a steel shank.

TRY A TEST WHEEL—Write us what material you have to finish and size wheel you'd like. We'll send one promptly.

Write for Catalog of Complete Chicago Line

CHICAGO WHEEL & MFG. CO.
1101 West Monroe Street Dept. FD. Chicago 7, Illinois

Half a century of specialization has established our reputation as the small wheel people of the abrasive industry.

Send Catalog. Interested in ☐ Mounted Wheels. ☐ Grinding Wheels. ☐ Send Test Wheel. Size.....

Name .....

Address .....

(*Continued from page* 184)

by George White, supervisor of foundry production at Enterprise Engine & Foundry Co., South San Francisco, who explained the use of the Produc-trol system, to an interested audience, before Tom Osborne, manager of the Produc-trol Pacific Co., took over to add some finishing touches and to pass out pamphlets giving complete information.

Our principal speaker was Lawrence D. Pridmore, International Molding Machine Co., Chicago, who used slides to illustrate his discussion on various types of laundry equipment. He gave a short history of the development of core blowing machines and made it clear that there were many points to be taken into consideration to get best results.—*Richard Vosbrink, publicity chairman*

Western New York

APRIL 13 meeting of Western New York Chapter of the A.F.A. was held at Hotel Touraine, Buffalo with 75 members and guests in attendance. Chairman Reinhold D. Loesch presided. Henry C. Winte, Worthington Pump & Machinery Corp., technical chairman for the evening, introduced the speaker, Thomas E. Barlow, Battelle Memorial Institute, Columbus, O., whose subject was "Cupola Practice."

Mr. Barlow pointed out that the main consideration in cupola control is supervision. Because it is easy to make iron in a cupola the majority of cupolas in the country are operated by a cupola tender instead of a trained melter. This usually results in a lack of economy as the cupola is not operated under close control and too often it is necessary to make a much higher strength iron than is specified to be sure of meeting specifications. Many times expensive alloys are used in order to get the necessary strength from a poor base iron whereas close control would produce the proper iron from the cupola. Poor cupola operation makes scrap castings due to cold iron and high shrinkage. Uniformity cannot be consistently controlled with poor supervision on the cupola.

The speaker said that he personally preferred a single row of tuyeres of the proper area, and stated that regardless of the type of tuyere used there is no direction left in the air 4 or 5 inches from the tuyeres inside the melting zone. While the diameter of cupola and height of coke bed may be perfect at the start of the heat, this is changed quickly due to burnout during the operation, and compensation should be made to retain the proper height of the bed. This can be regulated much better by using a volume measurement on the bed and also on the coke splits.

Due to difference in weight of coke a more consistent height of bed and uniform temperature can be maintained by measuring the coke splits by volume instead of by weight. A definite time schedule in burning the coke bed should be used in addition to accurate measure-

(*Concluded on page* 188)

Over 1,625 Flasks EVERY HOUR!

The installation above, consists of two 3′ x 8′, Model "B" Simplicity Shake-Outs. It is probably the most automatic, high speed shake-out in operation in the world today! The upper unit is equipped with a horse, or bolster over which all the flasks must pass while suspended by the arm clamps on the conveyor overhead. This upper unit shakes out over 1625 flasks per hour, while the lower unit knocks out 95% of the core sand from all fittings or castings. Over 1200 units are giving maximum service daily in over 550 foundries and handle a variety of work from a great number of flasks per hour, to 95 ton loads which are shaken out in two to three minutes. Speedier shake-out with maximum flask savings and the reduction of manpower required amortize the equipment cost in less than a year. Every Simplicity unit can be used portably until permanent installation is desirable Have a Simplicity Engineer check your requirements

MEMBER

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

Simplicity

TRADE MARK REGISTERED

ENGINEERING COMPANY

DURAND, MICHIGAN

UNSKILLED LABOR ADDS NOTHING TO A PRODUCT EXCEPT COST
CLARK
CLARK Gas Powered FORK TRUCK
CLARKAT 2,000 to 2,600 lb. D.S.P.
CLARKTOR-6 2,100 to 5,000 lb. D.S.P.
CLARK ELECTRIC FORK TRUCK 1,000 to 7,000 lb. capacity
RELEASE MEN TO PRODUCTIVE WORK
This is the efficient mechanical crew that has freed men for vital production jobs . . . . CLARK Fork Trucks and Industrial Tractors
They have promoted Materials Handling to be a well engineered, carefully planned part of Planned Production. Write for our condensed vest pocket catalog.
Another PRODUCT of CLARK EQUIPMENT COMPANY
CLARK TRUCTRACTOR
BATTLE CREEK, MICHIGAN, U.S.A.
Products of CLARK • TRANSMISSIONS • ELECTRIC STEEL CASTINGS AXLES FOR TRUCKS AND BUSES • AXLE HOUSINGS • BLIND RIVETS INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

(*Concluded from page 186*)

ment of the height. Regulating and recording instruments are very essential on a cupola.—*J. Ralph Turner, secretary.*

Southern California

A LIVELY discussion of compensation insurance filled an extra long session at the regular monthly dinner meeting of Southern California Chapter of the A.F.A. held March 23 at the Los Angeles Elks Club.

Formal talks by Reese Tydings, California Casualty Indemnity Co., and W. G. Heberling, State Compensation Insurance Fund, led to an open forum interchange on the ground that they do not fog readily. tion centering on silicosis and safety costs.

Guided by W. D. Bailey Jr., president of the chapter, members aired opinions relating to the chronic difficulty of inducing employes to heed safety rules in general and in particular those relating to wearing of eye-protection devices, eye injuries having been shown to predominate in steel and iron foundry operations.

Advocates of goggles, face shields and plain spectacles took the floor in turn. Goggle fog was said to be avoided by the use of shields. Champions of goggles countered by declaring that it is "too easy for workmen to lift the shields" and thus expose the eyes. Spectacles were defended on the many phases of accident preven-

Mr. Heberling asserted that dust control equipment in too many plants is antiquated. He urged his hearers to use only Bureau of Mines tested devices on the ground that only these are recognized as adequate by courts of law.

Mr. Tydings showed that steel foundries have achieved greater efficiency than have iron foundries in the prevention of eye injuries. This he attributed to better organization of, and adherance to, specific programs for accident prevention.

He stressed the fact that casualty companies give due credit in terms of premium dollars for recognized and practical aids to safety actually installed and functioning inside any foundry or other plant. —*Maurice Beam.*

St. Louis

CECIL E. BALES, vice president, Ironton Fire Brick Co., Ironton, O., and chairman of the A.F.A. Refractories Committee, was the speaker at the April 12 meeting of the St. Louis District Chapter of the A.F.A. which had an attendance of 78 members and guests.

Mr. Bales, in his talk, brought out the comparative qualities of the fire brick made today as contrasted with brick manufactured during the last war. He said that great strides had been made in the last 5 years in the making of brick and that the industry was very proud of its war record. The speaker outlined the methods used in the production of fire brick and mentioned their many uses. Considerable discussion followed the talk.—*Charles E. Rothweiler, secretary-treasurer.*

SHARP TEETH, STRONG JAWS... FOR A 30-TON BITE

Scooping up 30 tons of earth and rock in a single bite is all in the day's work for the behemoth shovels now in use in the strip mining of coal.

Forgings for the cutting teeth and castings for the outsize scoops are fabricated of alloy steels—because alloy steels do the job better! Their greater strength permits important weight savings, frequently permits design of smaller, thinner sections, gives material economies, increases wear resistance and gives long service life required for the toughest assignments man can devise for metals.

Metallurgists and engineers of the Vanadium Corporation of America are working hand in hand with the engineers and designers in all branches of industry in developing new applications for alloy irons and steels, where these modern materials offer new opportunities for product improvement and service economies.

Today, our greatly expanded production and research facilities are working in the cause of Victory. But new developments, new ideas, and added wartime experience will combine to shape new concepts of progress through still wider application and use of alloy steels in tomorrow's peacetime world.

MAKERS OF VANCORAM FERRO ALLOYS AND METALS

VANADIUM • SILICON • GRAINAL ALLOYS • GRAPHIDOX
CHROMIUM • TITANIUM • V-FOUNDRY ALLOYS • ALSIFER
SPECIAL ALLOYS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

Readers' Comment . . .

Reprints Available

To the Editors:

Your editorial on page 97 of the April Foundry which includes the telegram sent by Mr. Rose to various government departments should be attached to every request for deferment in the foundry industry. Would it be possible to secure reprints of this page?

M. E. Ledlie

Ideal Furnace Co.
Detroit 2, Mich.

Editor's Note: A limited number of reprints of this editorial are available to interested foundries.

Preventing Shrinkage

To the Editors:

In the March issue under "Questions and Answers" on page 104, "Defects Appear Under Risers," I believe the shrinkage under the riser can be prevented by having a third gate into the top of the liner at the riser, which will provide hot metal in the risers. By no means should the riser be fed with a rod, since pumping, in my opinion, spoils more castings than it ever saves.

This method provides hot metal in the riser for feeding. Furthermore, step gating of this type would provide for the coldest metal in the bottom, with hotter metal up to the riser. Freezing will take place progressively from the bottom to the top to the feeder.

I find that many foundries do not like to pop gate a cylinder because of the dirt, etc., caused by the splashing or washing of the sand marking the lowest third of the casting. It requires some experience with the pop gating method to prevent these splasnings, altnough when it is under control, it is a good one to use for cylinders.

I would also suggest that the riser be attached with the knock-off riser attachment; that is, a connection between riser and casting of about 1" diameter, with a slab core about ½ to ¾" thick. The slab core attains the metal temperature and feeds adequately without openness in the center of the riser connection. Incidentally, the riser is easily broken from the casting.

Fred G. Sefing,
Development and Research Division
International Nickel Co. Inc., New York

Foundry Leadership

To The Editors:

In your December issue, Robert E. Wick holds a lamp over a dark corner of our industry. I am moved to reflection and to write you on his subject. I feel close to it.

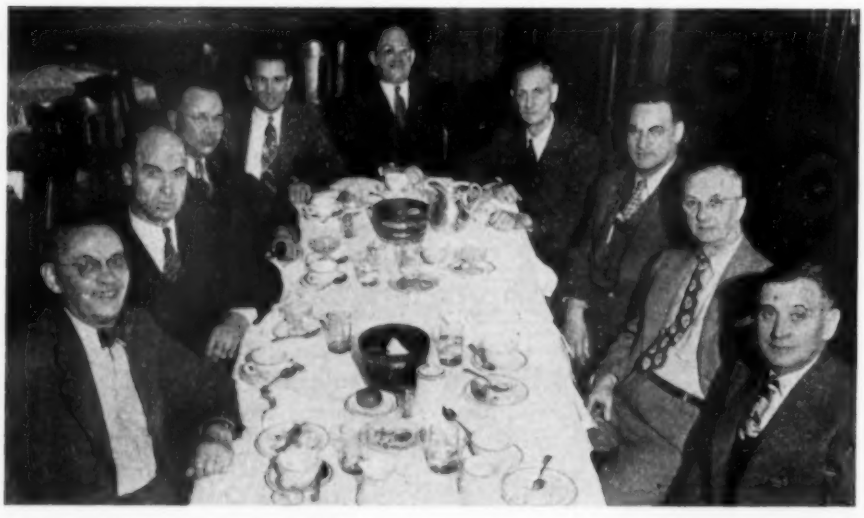
I believe that the foundry industry in America assumes more risk and takes less profit than any other industry in America.

I believe that foundrymen, either tradesmen or professionals, give more effort, time and thought to their tasks and in return take less pay than any other group of tradesmen or professionals in America.

I believe that foundry operations are more poorly housed than any other manufacturing operations in America.

Construction of war facilities has contributed to the latter solution but, nevertheless, it is most difficult to accept any of these statements as truth and not be concerned with a permanent remedy. Does this prompt us to examine the quality of our leadership? Does it suggest that our industry needs men who will fight more for recognition of our products and less with each other? Could it be possible that the employment of more men of broad education will help find a solution? Do the rays of Wick's lamp fall here?

A Foundryman



WISCONSIN PATTERNMAKERS: *One of the largest and most active groups of the Wisconsin Chapter, A.F.A., is its pattern group committee, headed by A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee, as chairman. Members of the committee shown here, left to right, are: A. M. Fischer, Chas. Jurack Co., Milwaukee; W. T. Schmidt, Giddings & Lewis Machine Tool Co., Fond du Lac; M. C. Frankard, Delta Mfg. Co., Milwaukee; A. G. Knudsen, Allis-Chalmers Mfg. Co.; Mr. Pfeiffer; H. J. Wade, Fairbanks, Morse & Co., Beloit; P. E. Riedel, Production Pattern Works, Milwaukee; R. G. Metzger, Nordberg Mfg. Co., Milwaukee; A. Weberg, Belle City Malleable Iron Co., Racine*

Book Review

Foreman's Basic Reading Kit; fabricoid; 212 pages published by the American Management Association, 330 West 42nd Street, New York 18, N. Y.

Prepared in ring binder form to facilitate inclusion of later material, this book is especially designed to reach management's supervisory executives. That the subject is covered from practically every angle may be seen from the following list of papers and authors:

"Foreman's Role in Management," by E. B. Roberts; "Management the Simple Way," by Lawrence A. Appley; "Understanding People in Work Relationships," by Ellie C. Maxcy; "Training in the Skill of Leadership," by Walter Dietz; "Consultive Supervision and Management," by H. H. Carey; "Foremen and Human Relations," and "How To Interest The Employe in His Job," by Robert A. Sutermeister; "Introducing the New Employe to His Job," adapted from material developed by the Training Within Industry Branch of the War Manpower Commission; "How To Improve Morale and Increase Production," by Robert A. Sutermeister; "Helping The Worried Worker," adapted from *Industrial Mental Health;* "Foreman's Part in Preventing Absenteeism," by C. G. Mitchell; "Constructive Discipline in Industry," and "Supervision of Women on Production Jobs," adapted from various sources; "Foremen's Discipline Check List," by Frances Spodick; "Foreman's Balance Sheet," by Harrison F. Dunning; "A Supervisory Review Plan," by Armstrong Cork Co.; "Supervision of Apprentices," by O. L. Harvey; "Principles or Factors in Organization," by Henry E. Niles; "Ten Commandments of Good Organization."

Issues Fire Codes

National Fire Protection Association, 60 Batterymarch street, Boston, has published a reference volume, "National Fire Codes for Flammable Liquids, Gases, Chemicals and Explosives, 1945," containing information on new chemicals and solvents used in war industries, their fire hazard properties, and the best method of fire extinguishment. It supersedes a similar volume published in 1943, and is priced at $3.

HI-TEMP-GAN

TRADE MARK

the perfect material for

FURNACE LININGS
LADLE LININGS
CUPOLA LINING AND PATCHING

This South Dakota gannister makes a smooth, hard, non-spalling surface which resists high temperatures and abrasion and gives maximum lining life. It is furnished in a variety of sizes to meet the requirements of the most exacting foundryman.

OTHER "NATIONAL" PRODUCTS

Lake Sands
Bank Sands
Blasting Sands
Silica Sands
Molding Sands
Fire Brick
Fire Clay
Bonding Clay
Gannister
Firestone
Limestone
Silica Flour
Western Bentonite
Southern Bentonite
Steel Shot and Grit
Blast Nozzles
Foundry Coke

NFS

NATIONAL FOUNDRY SAND CO.

2970 West Grand Blvd., Detroit, 2, Mich.

Speaking of Shakeouts

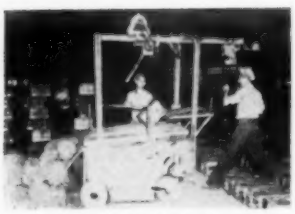
WHAT ABOUT AVAILABLE LABOR?

ONE REASON why it has been so difficult to get shakeout labor is the fact that so much brute strength is required to handle flasks—especially those too small or light for mechanical lifting devices yet heavy enough to tax the strength of humans. Only strong, husky men can handle them—and the supply of such men, even in the best of times, is greatly limited.

Now, Robins changes that condition entirely. With a Floatex Shakeout equipped with the new Robins Flask Loader, anyone can handle the shakeout operation . . . young men, old men, thin men, weak men—even women.

For this Loader removes all the labor from the task of bringing flasks to the Floatex. A low-horsepower motor lifts the load. One man (or woman, or boy) attaches the tongs and guides the flask to the Floatex loading table. Another attendant throws the switch that operates the Loader, and stacks the empty flasks and the bottom boards.

The Loader lifts; the Floatex shakes-out . . . shakes-out quickly, completely, effortlessly . . . shakes the flask, not the building.



Patent Applied For

Entirely new sources of labor supply are being tapped by foundries equipped with Floatex Shakeouts. Even without the Flask Loader, the introduction of a Floatex has permitted employment of women to do shakeout work. With the help situation as critical as it is, perhaps you had better learn what a Floatex can do for you. Full particulars are yours for the asking; no cost, no obligation. When writing for them, please address Dept. F-5.

Robins Floatex Shakeouts are made in Portable models for loaded flasks weighing up to 17 tons; in Standard models, up to 100 tons or more. Non-discharging and self-discharging types; with or without Flask Loader.

ROBINS makes: BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . It's ROBINS

ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS CONVEYORS INCORPORATED
Founded in 1906 as Robins Conveying Belt Co.
PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

PROPERTIES OF CAST AND FORGED STEEL

(*Continued from page* 93)

of 331 to 341 brinell. Standard 0.505-inch tensile bars were machined eccentrically from the longitudinal cylindrical sections of specimens from Heats 1 and 2, and half-size bars from the same location in Heat No. 4 which had been split for macroetching. Halfsize bars were machined from the end sections and standard keyhole notch Charpy bars from both sections.

The data from these bars indicate a small general improvement in the mechanical properties as a result of forging. There was a marked improvement in soundness, but it seemed clear that this improvement could not be relied upon to eliminate defects in unsound castings.

Some pertinent data were obtained while those cast blanks were being forged. The regular forgings were made from 2½-inch sound rolled steel. This stock was sawed into 9-inch long forging blanks. The blanks were heated and the tong hold forged on as the first operation. After reheating, the forging was completed. The castings were heated once and the forging completed with a few blows.

Compare By Time Study

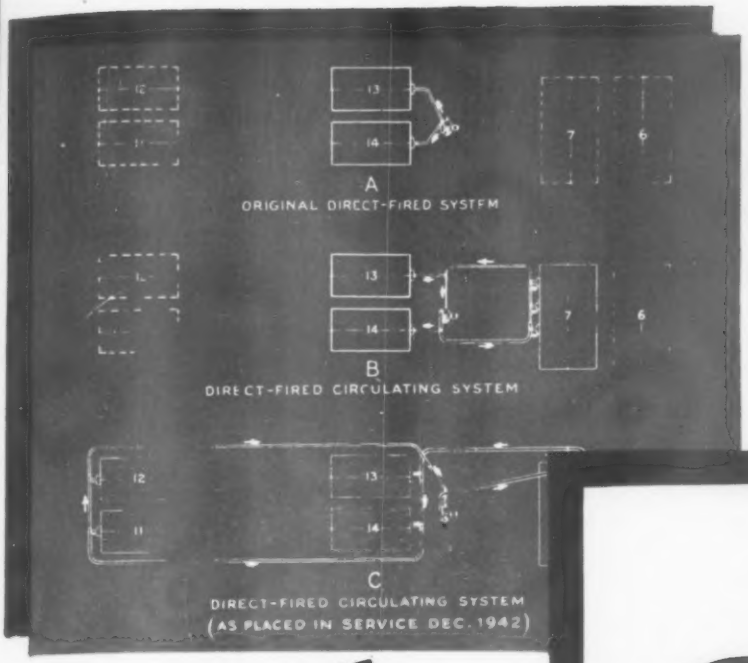
A time study showed the following comparison: To saw three blanks from the rolled stock required 20 minutes on a high speed saw or 30 minutes on a low speed saw. This is at the rate of nine per hour or six per hour, respectively. Thirty-five blanks are charged to the furnace and require 7 minutes to heat to 1800 degrees Fahr. It requires 6 minutes to forge the tong holds on these 35 pieces after which they are put back in the furnace. By the time the tong hold is forged on the last one, the first is ready for the final forging. It then requires 10 minutes to finish the forging on the 35 parts. It requires 8 minutes to heat 35 cast blanks to 1900 degrees Fahr., and they can be finish forged in 4 2/3 minutes.

If only the forging time of one man and one hammer is considered, forgings from rolled stock can be made at the rate of 131 per hour. Starting with cast blanks, they can be made at the rate of 450 per hour. This, of course, considers only the output of a forging hammer and does not take into account the difference in cost or man-hours of the rolled steel blank and cast steel blank.

As a side issue of the main project, it was requested that the comparative qualities of seamless tubing from centrifugal castings and from pierced billets be examined.

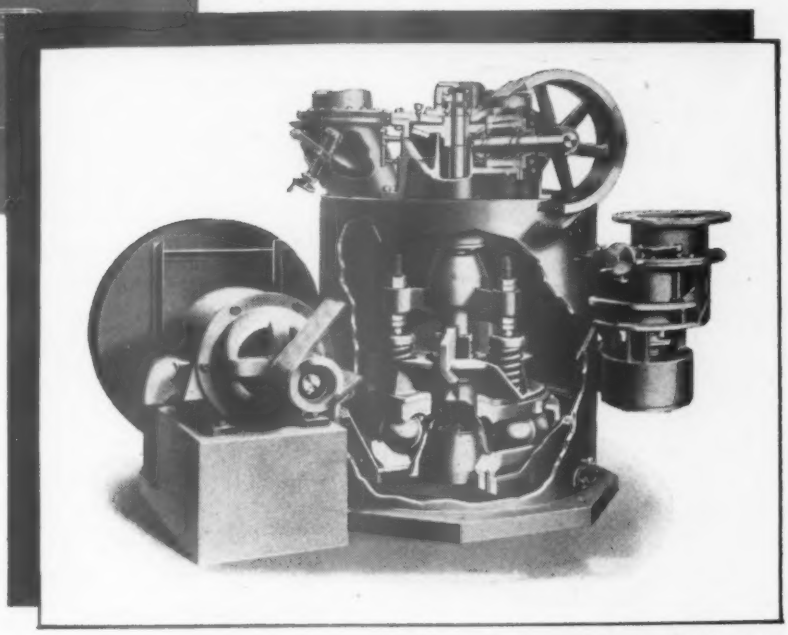
Centrifugally cast hollow cylinders, 4½ inches and 3⅜ inches outside diam-

(*Concluded on page* 195)



SAVINGS START HERE

with the B&W Direct-Firing Pulverized-Coal Circulating System



Cutaway view of B&W Type B Pulverizer

Substantial savings in installation, operating, and maintenance costs over other methods of firing metallurgical furnaces are made possible by the B&W Direct-Firing Pulverized-Coal Circulating System. A single pipe looped overhead and around several furnaces supplies air-borne pulverized coal of proper fineness to as many burners as are required for the service. Automatic control provides the same flexibility as obtained with oil or gas. With this method of firing, only ONE pulverizer is needed. It can be set where convenient; saving floor space and eliminating interference with product handling at the furnaces.

With this system you save fuel, reduce heating cycle time, and increase production. These savings begin at the heart of the system—the B&W Type B Pulverizer. Fuel distribution and capacity of the system, whether for single or multiple furnace operations, is assured because the Type B Pulverizer is built to stay on the job and to pulverize its rated capacity in coal to the fineness necessary for the specific requirements of each installation. This pulverizer is of the same type as that widely used for firing boilers and cement kilns, where sustained fineness and capacity of product and continuous low-cost operation are governing factors. They assure the same dependable service in this simplified method of firing metallurgical furnaces.

BABCOCK & WILCOX

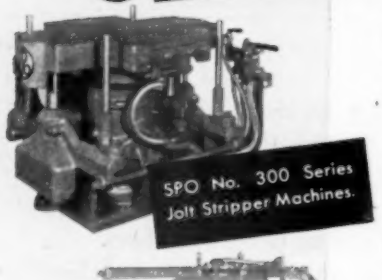
PM-105

THE BABCOCK & WILCOX CO. 85 LIBERTY STREET, NEW YORK 6, N. Y.

SPOs GIVE YOU HIGHER PRODUCTION *with Accuracy*

SPO No. 100 Series Jolt Squeezer Machines, CANTILEVER Type.

SPO No. 200 Series Jolt Squeeze Stripper Machines, CANTILEVER Type.



SPO No. 300 Series Jolt Stripper Machines.

SPO No. 500 Series Jolt Rockover Draw Machines.

Production AND Accuracy on a Wide Range of Work

SPO Molding Machines needed no overhauling to get under the added burden of war. Improved? Certainly! They have been, are being, and will continue to be. But essentially their design goes on unaltered.

SPOs *conserve molding skills.* Extreme simplicity is responsible—a mere control or two, with critical operations fully automatic. Beginners turn out plenty of *accurate* molds virtually over night. "They can't miss", says one foundryman. You have no long, unproductive training period. Everybody is happy.

This "easy-to-understand" advantage combines with rugged construction and a minimum number of working parts. Result? Maintenance just about vanishes. Shut-downs due to "trouble" are practically nil. Your skilled repairmen are saved for *more important duties.*

Moreover, you can pair up certain SPO Molding Machines most profitably. The No. 200 or No. 300 Series teams perfectly with the No. 500. Other combinations are similarly effective. You get plenty of speed *with accuracy* on a wide variety of jobs.

Bulletins showing capacities and other specifications on SPO Molding Machines will be sent upon request.

SPO No. 100 Series Jolt Squeezer Machines, POST Type.

SPO No. 200 Series Jolt Squeeze Stripper Machines. POST Type.

SPO No. 400 Jolt Squeeze Rockover Draw Machines.

How about vibrators? Have you a good stock of *new* ones? New vibrators cost very little. Don't discourage experienced molders with patched or lost molds. Ask about SPO Vibrators, with pinless anvils and other features

★ ★

MEMBER

MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO

(*Concluded from page* 192)

eter were cast from S.A.E. 4130 steel at the experimental laboratory of the United States Pipe & Foundry Co., Burlington, N. J. These were sent as rough cast to the Globe Steel Tubes Co., Milwaukee, where they were processed into tubing.

The 4½-inch castings were hot rolled to 4 inches and then cold drawn to 3½ inches outside diameter. The 3⅜-inch castings were hot rolled to 2½ inches and then cold rolled to 2 inches outside diameter. Specimens of both tubing were sent to Battelle for examination along with specimens of the regular production of tubing made from pierced billets.

A comparison of the surface condition of the two types of tubing is obtainable from the pictures of the macroetched specimens Figs. 6 and 7. It will be noted that, so far as the outside surfaces are concerned, there is very little difference, but that the inside surface is better on the specimens from pierced billets.

In flattening tests carried out according to A.S.T.M. Spec. A8342, Section 5a, both types of 3½-inch tubes showed equally good properties, while both types of 2-inch tubes failed. In a nonstandard reversed flattening, the pierced 2-inch tubes gave a better test. Tension test specimens cut from the tubes showed equal mechanical properties.

MELTING FERROMANGANESE IN CUPOLAS

(*Continued from page* 107)

door was sufficient to hold about six charges, each of 600 pounds. The lining was ordinary clay brick, and as the cupola had been idle for several years, it was not in the best of condition.

The bottom and breast were made up of the same materials and in the same manner as for regular cupola practice, the bed lighted and burned through in the conventional manner, and ferromanganese in 600-pound lots was charged. Following the practice suggested by Hadfield, old oil drums with neither tops nor bottoms were placed in the cupola and the ferromanganese shoveled inside them, with coke around and over the drums. The coke-to-metal ratio used was the same as in regular cupola operation, and was never changed after the first successful day's run. A small amount of limestone was added with each charge of metal, the slag problem not having as yet been given proper consideration.

A few preliminary runs taught us to use a very low blast pressure, the regular practice being to carry about 2 ounces on the pressure gauge, and never increase it unless it was necessary to drive a bit faster for a short period to catch up with the converters. As will appear

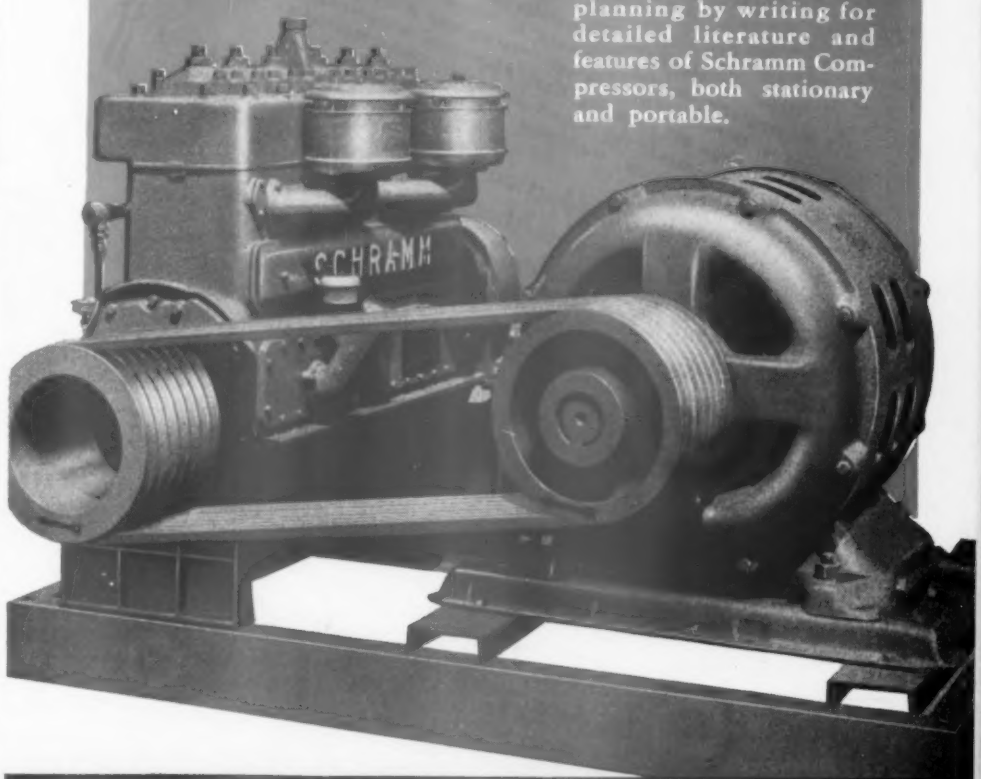
4 REASONS
POWER PLANTS SPECIFY
SCHRAMM
AIR COMPRESSORS

1. 100 PER CENT WATERCOOLED
2. COMPACT—LIGHTWEIGHT
3. MECHANICAL INTAKE VALVE
4. FORCED FEED LUBRICATION

There are many compressed air jobs to be done by Power Plants, and into this versatile picture fits the Schramm Air Compressor. Its features enable compressed air jobs to be done quickly—easily—economically!

Illustrated here is a stationary unit, one of many types of Schramm Compressors. They are designed for heavy duty, continuous service, with minimum attention.

Schramms are built in sizes ranging from 20 to 600 cu. ft. displacement in every type of mounting and assembly. Start your compressor planning by writing for detailed literature and features of Schramm Compressors, both stationary and portable.



SCHRAMM INC.
THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

Special Aluminum Alloy Melted in Crucibles

Oscar W. Hedstrom Corporation foundry, Chicago, Illinois. Photograph courtesy Howard G. Mayer & Associates, Chicago, Illinois. For data see "Metals and Alloys," September 1944, page 643, "Strong Cast Aluminum Alloy—requiring no heat treatment," by Albert J. Matter, Chief Mechanical Engineer, Oscar W. Hedstrom Corporation.

In quantity production or special alloys, crucible melted metal meets the specifications. Crucible melting allows close metallurgical control, extreme flexibility in output, and is the most practical economical method.

For melting small heats or large, use crucibles for the best profits. Crucible furnaces are the most adaptable for production, jobbing or special purpose alloys.

Crucible Melters Handbook gives profitable information on the care of your crucibles.

Typical Crucible Furnace Installation No. 4

CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST STREET, NEW YORK 6, NEW YORK

later, this practice was never resorted to unless absolutely necessary. The metal melted freely, our chief obstacle being that though we were able to use the sheet metal drums for the first six or eight charges, the difficulty of getting them in position for the later charges was too great, and we were obliged to simply shovel the ferromanganese in, as much as possible in the center of the cupola. The ferro was charged as received, only the largest lumps being broken with a sledge.

On our first two days regular operation we melted 12 or 14 charges of 600 pounds each, tapping the cupola six or seven times. The ladle was set on a weigh scale platform under the cupola spout and no difficulty was encountered in securing the correct amount of molten metal. The ladle, after the right amount of ferromanganese had been tapped into it, was carried by the crane and filled with the blown metal from the converter. The stream of blown metal had sufficient velocity to give a proper admixture of the two metals, assisted, of course, by diffusion, and numerous tests showed that there was never more than a trifling difference in the analysis of the first and the last metal poured from a ladle.

Slag Is Corrosive

As we might have expected, however, and as the present generation is learning to its sorrow, the slag produced in the melting of ferromanganese is exceedingly corrosive. The oxidation is evenly divided over the iron, manganese, carbon and phosphorus, practically no change in the chemical composition of the metal occurring during melting. The result, of course, is that there is produced some 80 parts of MnO, 13 parts of FeO and a small amount of P_2O_5. The carbon lost is naturally carried off as CO or CO_2, and the only SiO_2 produced is the small amount in the ash of the coke and a trifling quantity due to the oxidation of what little silicon there is in ferromanganese. As the silicon is generally much under 1 per cent, the acid ingredients necessary to form a slag are almost totally absent. To make matters worse, in our first two days' runs we had added even more base, in the form of limestone. Thus the appetite for acid materials of a certain amount of CaO was added to that of the FeO and MnO we were producing. It is not at all surprising, then, that on the second day we cut through the lining of the cupola in the melting zone, and had to turn water on the cupola shell to keep from burning it entirely through.

A little reflection showed that the conditions we were faced with were exactly the same as those met in smelting calcareous ores in the blast furnace. Under those circumstances, sandstone or other siliceous material is used as flux to produce a fluid slag, instead of the limestone employed with ores whose gangue material is acid (siliceous). It has seemed to the author that as calcareous ores like the "black-band," "Cleveland" and other

(*Continued on page* 198)

HOWARD craftsmen and facilities are available to produce quality wood and metal patterns.

HOWARD craftsmen thoroughly understand foundry practices.

HOWARD patterns are engineered to fit your foundry requirements.

HOWARD modern facilities include two three-spindle type Keller Duplicators which are available for all types of metal duplicating work.

HOWARD FOUNDRY CO.

Pattern Division

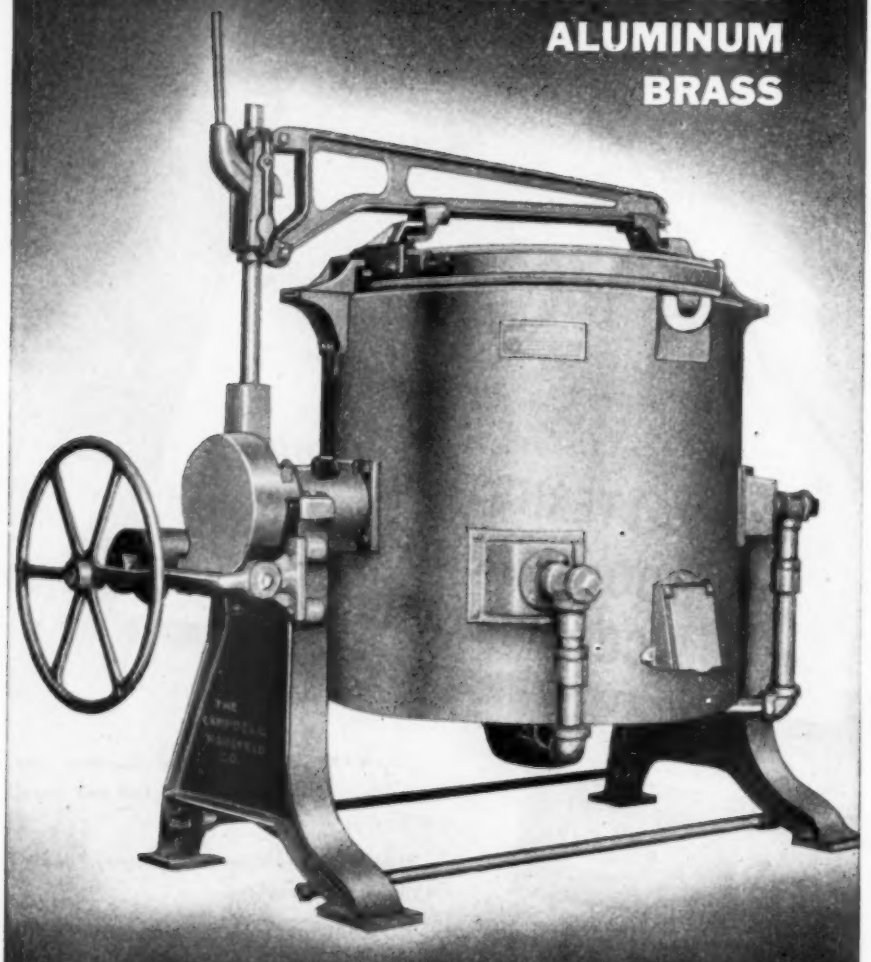
General Office 4900 Bloomingdale Ave.

CHICAGO 39, ILLINOIS

HAUSFELD

A FURNACE FOR EVERY NON-FERROUS MELTING REQUIREMENT

MAGNESIUM
ALUMINUM
BRASS



Built for Service

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 196)

iron stones have for years been extensively smelted in British blast furnaces, British foundrymen faced with the necessity of melting ferromanganese in cupolas might have hit on the solution of their difficulties more readily. Rejecting well-meant suggestions that oyster shells be substituted for limestone, the author resorted to the use of old fire brick, crushed to walnut size, and placed on top of each charge of ferromanganese. About one scoop-shovelfull was used in each 600-pound charge of ferromanganese; the amount used is not critical. If too much is charged, the slag soon grows somewhat viscous, and a shovel of limestone on one or two charges is required to correct the composition of the slag. After operating a few days, the correct amount is easily determined.

The clay bricks consist, of course, chiefly of silica and alumina (SiO_2 and Al_2O_3) both of which probably act as acids in the slag formed, as there is already an excess of bases. The resulting slag, made up of SiO_2, Al_2O_3, FeO and MnO, with small amounts of CaO and MgO from the ash of the coke, is quite fluid and is readily run out of a tap hole placed just below the level of the tuyeres. As the percentage of manganese in the slag is usually around 40 per cent, some sort of a slag box should be used to catch the slag. Blast furnace operators are glad to pay a fair price for the slag, as it serves as a ready source of manganese in making basic pig iron.

Cupola Operated Satisfactorily

After being relined with clay brick our cupola, operated as described previously, gave singularly little trouble. At first it was feared that the lining might be cut away by a long day's run, and only 16 to 20 charges of 600 pounds each were melted. After a few weeks, however, it was found that these fears were groundless, and from 36 to 50 charges were melted regularly each day, with a high day of 60 charges. As already stated, the clay brick linings required only the patching at the combustion zone usually required in cupola operation, and linings were completely renewed only after a campaign of several months. We always used a retaining ring of angle iron just below charging door level in these cupolas, in order to hold up the bricks in the upper part of the stack and to enable us to renew the lining of the cupola proper without bringing down the stack brick, so that the complete relining was a comparatively short job. To meet the exigencies of the heavy melting schedule of wartime operation, a second cupola, the duplicate of the first one, was installed, and one was used each day while the other was chipped out and daubed up.

To put the matter of fluxing this cupola in a nut-shell, the oxidation products resulting from the melting of ferromanganese have a tremendous appetite for silica and alumina, and consequently attack clay brick linings severely. If

(*Concluded on page* 200)

How TO MAKE AND KEEP HOT BACKING SAND CONSTANTLY WORKABLE

TRY

"Marabond"

THE NEW TYPE ORGANIC BINDER
PROVEN IN ACTUAL USE

Ordinarily hot sands promptly lose their tempering water and become so stiff as to be unworkable when the molder attempts to use them. By adding ¾-1% of MARABOND to this mix and tempering to 6-7% moisture, such hot black sand will automatically level out and remain at a moisture content of 3%-3½% for an extended period. This results in a constantly workable backing sand without extensive retempering on the foundry floor.

Write for Additional Information and Samples

MARATHON CORPORATION

Makers of LIGNOLITE PATTERN PLATES

Chemical Division

ROTHSCHILD • WISCONSIN

Marabond

IDEAL CONDITIONER FOR HOT BACKING SAND

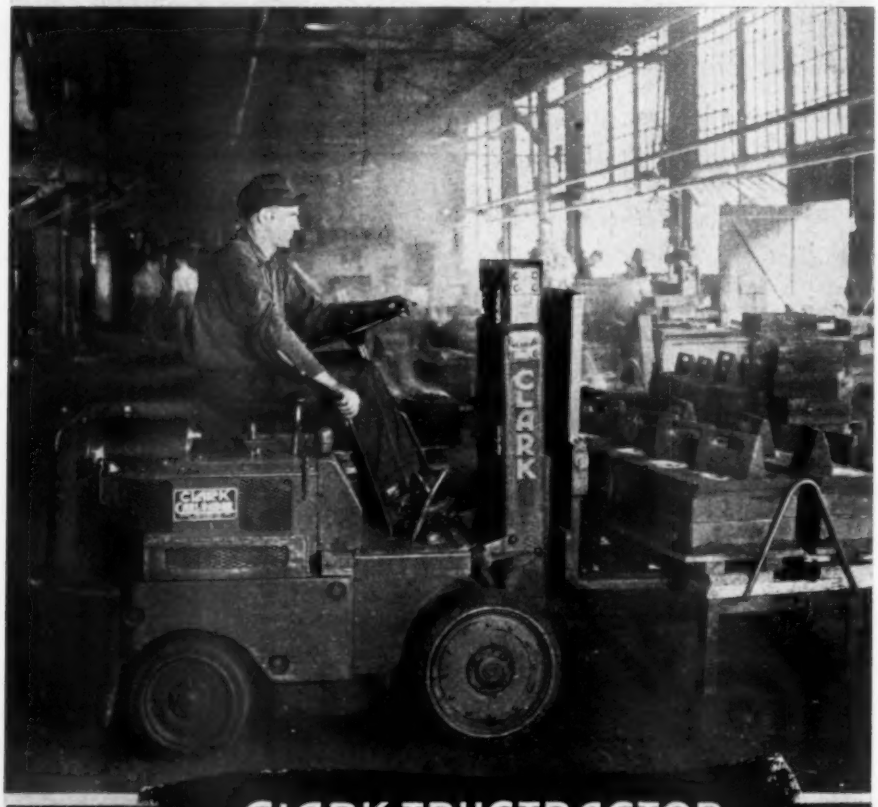
UNSKILLED LABOR ADDS NOTHING TO A PRODUCT EXCEPT COST

versatile, flexible power

Strike straight at your materials handling cost by using

CLARK fork trucks

—fast, versatile, flexible power ready 24 hours a day for any job of moving materials.



CLARK TRUCTRACTOR

BATTLE CREEK, MICHIGAN, U.S.A.

Products of CLARK • TRANSMISSIONS • ELECTRIC STEEL CASTINGS AXLES FOR TRUCKS AND BUSES • AXLE HOUSINGS • BLIND RIVETS INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

(*Concluded from page 198*)

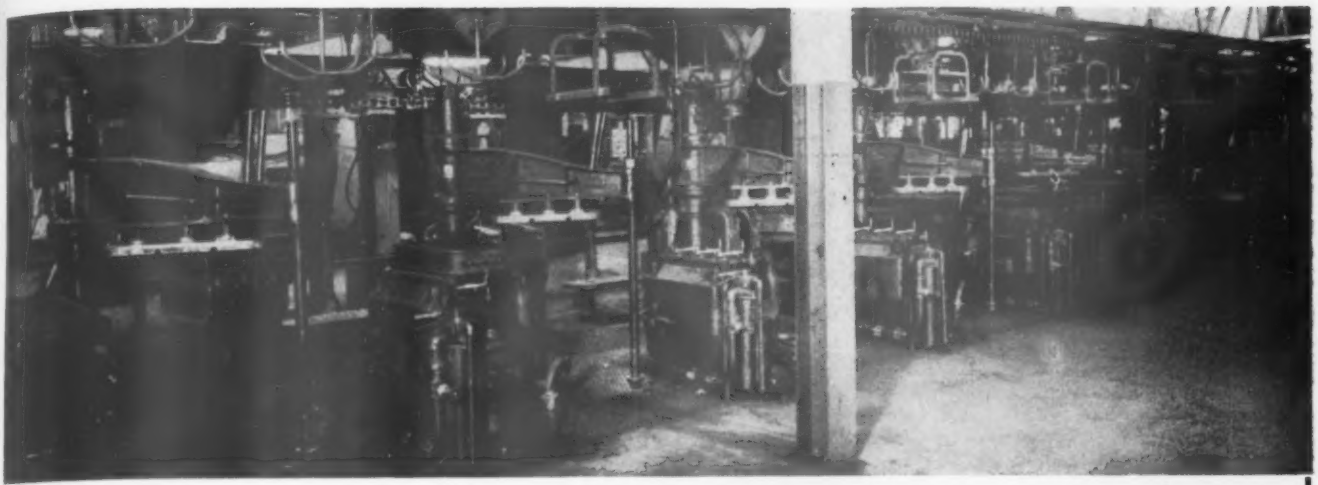
provided with enough broken pieces of old brick to "chew on," as it were, the oxidation products are neutralized, so that only the brick intentionally added is attacked, and the lining is spared.

A very careful check was kept of the amount of ferromanganese charged, the amounts tapped and the amounts recovered in the coke after the bottom was dropped. The actual melting loss ran regularly between 6 and 9 per cent by weight, with no change in analysis of the ferro. The higher figure generally resulted when for some reason the blast pressure had to be raised for a while to speed up the melting. As the total daily melt in the cupola was increased, the difficulty of getting the tins into the center of the cupola grew greater instead of less, and it was noticeable that the cupola tenders were using them on fewer and fewer charges as the days passed. However, no increase of melting loss, resulted from the larger percentage of the day's melt that was simply shoveled into the cupola in the conventional manner. Finally, for several days the tins were omitted altogether, even on the first charges placed in the cupola. The loss figure remained the same and thereafter no special method of charging was used. The ferromanganese was spread evenly over the coke charges, the broken bricks shoveled on top of the ferro and the next coke charge added. It was evident, therefore, that the use of low blast pressure and of bricks for flux were the only special precautions required.

Add Further Refinement

One further refinement was adopted after the cupola had been in operation somewhat over a year. It was noticed that the oxidation of the last charge in the cupola was greater than that of the earlier charges. This, of course, was because this charge was melted with the cupola nearly empty, and it was then nearly impossible to throttle the blast pressure down enough to maintain the minimum flow of air used during most of the day's run.

Covering the last charge of ferromanganese with an extra large charge of coke was tried, with little observable benefit. It was then decided that since so high a proportion of the total loss came in the last charge, we would operate, as it were, without a last charge. In other words, an extra 600 pounds of ferromanganese was charged every day, on top of the usual coke, and dropped with the coke when the day's run was over. Though nearly white hot when the bottom was dropped, this extra metal and the coke were easily quenched with a hose, and the extra labor of sorting out the ferromanganese from the "drop" was more than made up for in the 1 per cent decrease in the melting loss thus secured. Thereafter, the practice was unchanged, and for some 14 years ferromanganese was tapped every day from the cupola, as the shop superintendent remarked, "just like getting it out of a pump."

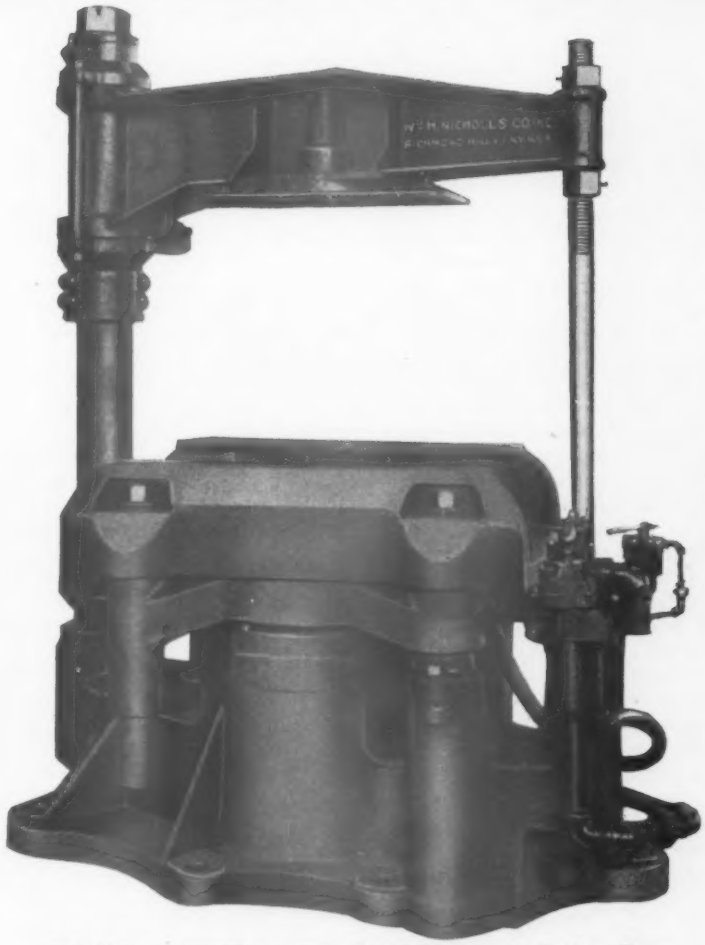


A Battery of Nicholls 16' Heavy Duty Machines

Nicholls' Molding Machines

Preferred by the Largest Foundries...

REDESIGNED to a minimum of working parts; thereby greatly reducing maintenance cost and, at the same time lowering operating costs through the saving of labor. The crossarm is equipped with a parallel squeeze plate which considerably reduces the amount of crossarm travel; resulting in faster operation and less effort required. The open end frame allows for flexibility in pattern lengths. Quick acting, yet so simple to operate that unskilled labor can be taught to make molds in record time.



#18-44 Type "K" Heavy Duty Jolt Squeeze and Pattern Draw Molding Machine, with open end frame and parallel squeeze plate, 18" diameter squeeze piston and 8" diameter jolt piston.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK

Established 1910

Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland.

NICHOLLS

The adventures of BILL

BY PAT DWYER
Drawings By RICHEY

SEEMS to me that some place in my early reading I came across a reference to some ancient superstitions and one thing and another about babies. At that stage of my existence if I had been asked to list the subjects in which I was interested, I either would have omitted babies altogether, or grudgingly would have admitted that perhaps they were a necessary evil, something that had to be endured like the weather, or school teachers, or going to bed with the birds and, worse yet, getting up with the same little treacherous renegades, hooting, yelling and squabbling in the trees before daylight.

In later years—and I mention this merely to show that I am adaptable as the next fellow in changing my mind—I discovered that babies outrank the entire list of interests. The delightful little tyrants are allowed to enjoy unlimited priorities. The daily household program is bent and twisted and amended to suit the convenience of a comparative little stranger who cannot speak a single word of our language and whose table manners usually are deplorable. Grabbers and splutterers!

The foregoing I am sure will be read with the keenest delight and appreciation by those who own babies, and will be wholeheartedly condemned as the purest and most undiluted piffle by those who have none.

Returning from this brief digression, dear brethren, let us consider an old time superstition among the Irish by which the parents, and others who possibly might be interested either naturally or through politeness, could determine in which field of human endeavor the baby was most likely to succeed in adult life. The theory on which the superstition was based would seem to indicate that human nature was about the same in the ancient days as it is now. Whoever invented or promulgated the idea shrewdly decided that a person was most likely to succeed in a field in which he or she was most deeply interested. After the fashion of all dealers in the occult, the inventor or promulgator left a few convenient loopholes through which he might wiggle if necessary.

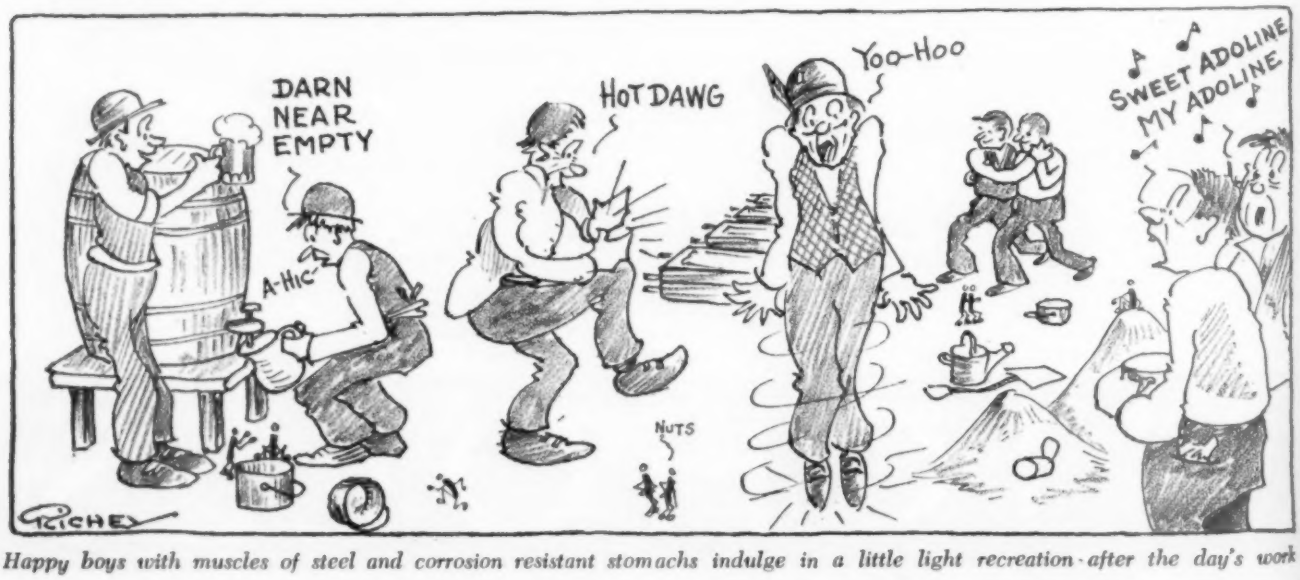
When the baby arrived at the grabbing stage, three saucers were placed within his reach. One was filled with water. One was filled with loose dirt. The third saucer contained a coin, or in the family of the more affluent, several coins. If the baby dipped his hand in the earth, he was destined to be a farmer. If he dabbled his little chubby fingers in the water, he was going to be numbered among those that go down to the sea in ships. If he ignored both water and earth and made a grab for one or all the coins, his career was to be that of a merchant or banker. Anyway he was headed for a life of luxury and ease. Usually when the saucers were set up for the experiment, the parents managed to place the coin saucer in the center and maybe a trifle closer than the others to the clutching hand. So far as my recollection goes, girl babies were not exposed to the test, presumably on the ground that they were not suitable timber out of which to fashion a farmer, a sailor or a financier. They were typed, as our Hollywood friends say, in one role, and that was producers of more babies.

If the old superstition still is in working order, I know at least one charming little lady who is headed either for the foundry or the blacksmith shop. Occasionally I am almost forced to the conclusion she will drift into a coal mine.

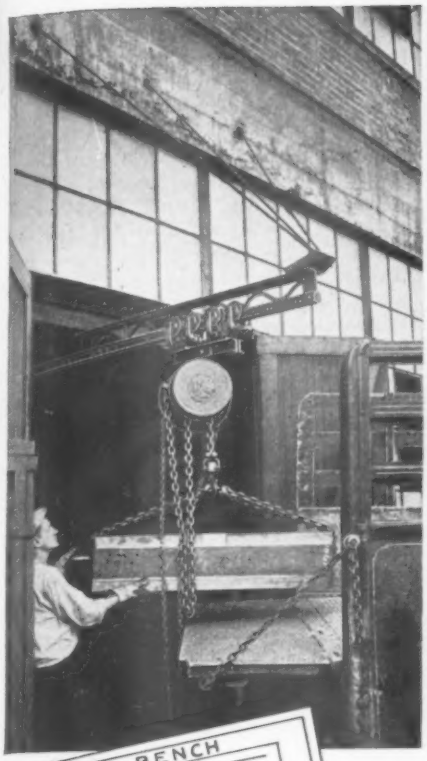
The attic is her favorite hunting ground when she does me the honor of paying me a visit now and again. After rooting around among a lot of old books and other odds and ends that have been gathering city dust and soot for years, she comes downstairs with a pair of hands that might gain her admission as a fully qualified member in any local of the Ancient Protective Order of Chimney Sweeps. When she has been put through the washer and wringer and decked out in a clean starched pinafore, her mother declares to one and all that she cannot imagine how or where or from whom the child inherited the gift of blacking her hands. She has hinted that heredity is a kind of a funny thing and she has heard or read some place that certain characteristics of a grandfather skip a generation, and by a curious freak appear in a granddaughter. I calmly ignore the accompanying look and cheerfully claim that I wouldn't know about that. It is a subject in which I never took any interest, for the very simple reason that I never knew my grandparents. They were gone, wherever grandparents go, long before I was born.

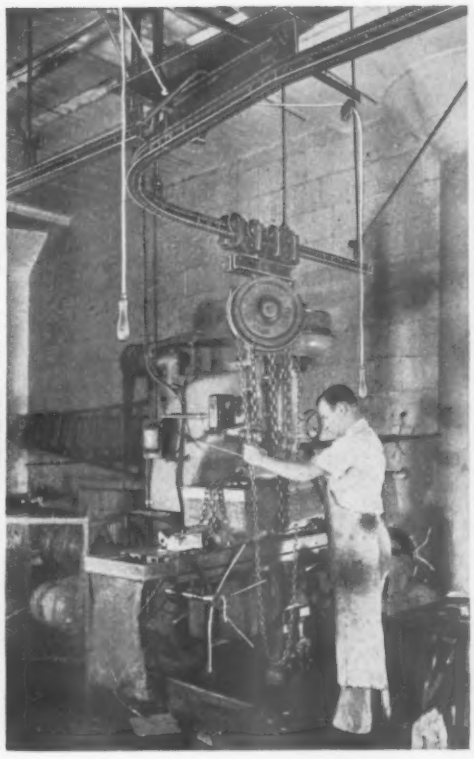
One night recently the little girl came

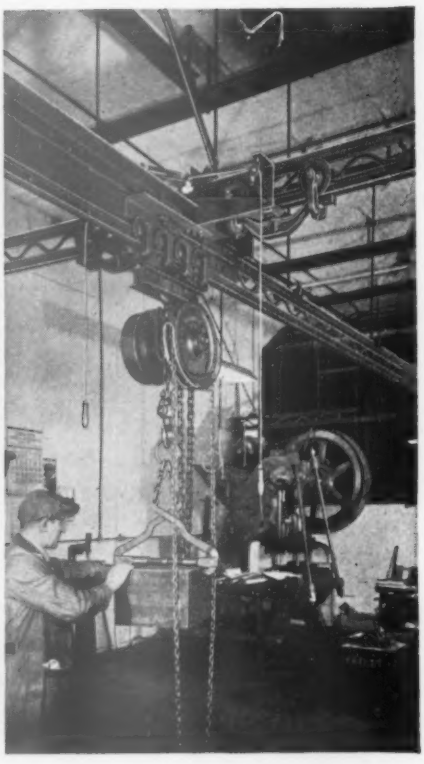
(*Continued on page 204*)

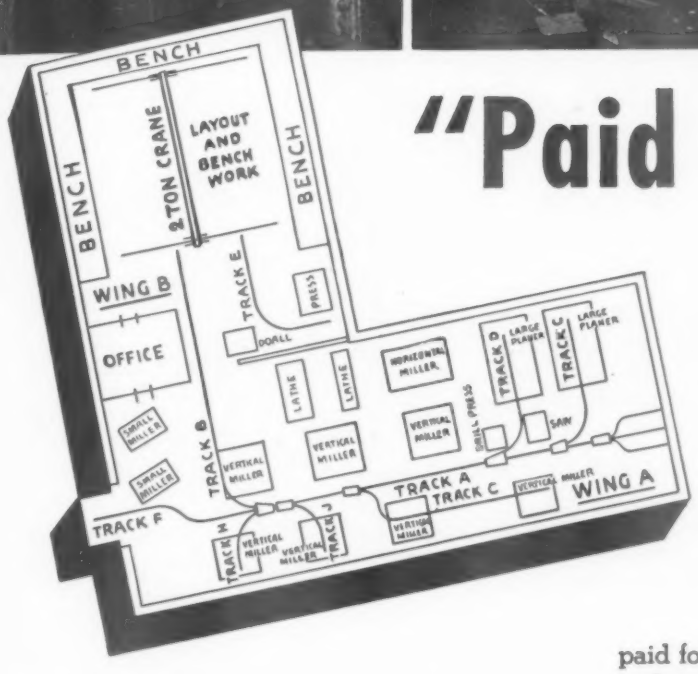


Happy boys with muscles of steel and corrosion resistant stomachs indulge in a little light recreation after the day's work



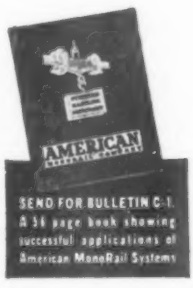






"Paid for Itself... Time and Again..."

"THIS system", says the owner, "has paid for itself time and again. Skilled die-sinkers and tool makers now work at their trade and spend little time lifting and straining to get blocks into the machines". Two ton die blocks in this small shop are handled overhead by American MonoRail. When this system was first installed it represented only a small part of the present track. Now, practically all manual handling has been entirely eliminated and every move from one machine to the other is done by American MonoRail.



An American MonoRail engineer will show you how to handle your products in less time and for less money.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVE. CLEVELAND 7, OHIO

Morton's
SALT TABLETS

NOW AS FAMILIAR AND NECESSARY AS THE DRINKING FOUNTAIN . . . .

Only a few years ago, the drinking fountain stood alone. Today, in practically all leading industrial plants, it has a partner, the salt tablet dispenser. For, wherever men work—and sweat — water and salt go together.

Salt is a balance wheel in the human body. It keeps body fluids in equilibrium and gives tone to the blood. When salt is lost the body becomes dehydrated and the blood thickens. The result is Heat-Fag, lassitude, inalertness. Production suffers and accidents increase.

The easy, simple, sanitary way to replace the salt lost through sweat is with Morton's Salt Tablets. It costs less than a cent a man a week to have them available at every drinking fountain.

In salt tablets, as with other grades and types of salt, Morton is the recognized leader. Order Morton's Salt Tablets and Dispensers from your distributor or directly from this advertisement. Write for free folder. Morton Salt Company, 310 South Michigan Avenue, Chicago 4, Illinois.

MORTON'S SALT TABLETS

Morton's Salt Tablets are available either plain or with dextrose.

Case of 9,000, 10-grain salt tablets - - - - - - - $2.60

Salt Dextrose Tablets, case of 9,000 - - - - - $3.15

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly—no waste. Sanitary, easily filled, durable.

800 Tablet size - - $3.25

MORTON'S SALT TABLETS

(*Continued from page* 202)

bouncing down the stairs with a book which I had not seen for more years than I care to count. It was bound in a red plush cover with an oval ivory center piece ornamented with a spray of forget-me-nots and the inscription *Autographs* in highly artistic and ornate script. Later after the visitors left the house I riffled through the pages and was mildly amazed to discover that I had not the slightest memory of approximately half the names signed in the book. Certainly it brought back a host of nostalgic memories of our first housekeeping years when the children were small and life went along like a song. My pipe was neglected and cold long before I laid the book down and crept away to bed.

"Where did you pick it up?" Bill inquired the first time he saw it. "I have not seen one of them things since I started to sport my first mustache. In the so-called good old days every house you went into had one of the cursed things sitting on a table in the parlor. Usually

Character study of Dictator, Junior grade

the property of the oldest daughter, if the house had an oldest daughter. Every visitor was cajoled, threatened, coaxed by devious wiles and maybe certain mild considerations to sign his or her name in the book. Signing the name imposed no particular burden even on the lads more accustomed to a shovel than a pen, but the tricky catch to the thing was that he had to set down a suitable sentiment above the name. At one time when the fad was at its height some inspired genius published a book, a collection of wise, witty, serious and humorous quotations suitable for an autograph album.

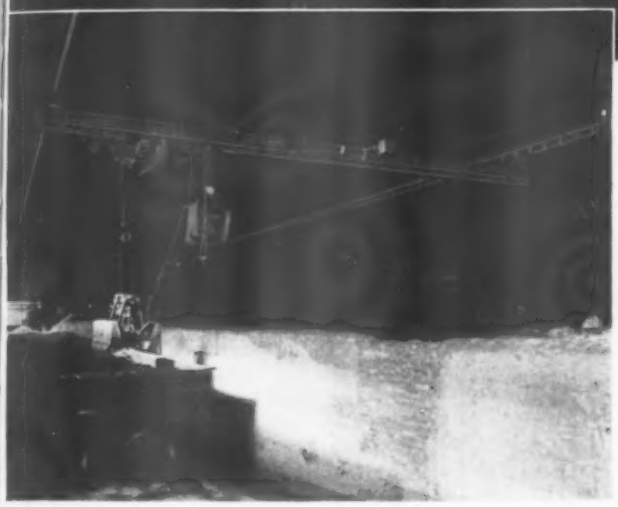
"Puss McCarthy out in the dog house —he was called Puss because—well because he had a puss—well, anyway Puss memorized half the book so that he could write a different sentiment in every book where he signed his name. The

(*Continued on page* 206)

CLEVELAND TRAMRAIL BUCKET CRANES

SPEED FOUNDRY SAND HANDLING ••

This crane has been operating successfully for 4 years, 24 hours a day. The single line grab bucket requires no motor and is of a type that eliminates most of the usual impact on crane. The bucket is easily detached when it is desired to handle loads with the crane hook.



The cranes are 44'-0" long and operate on two-track runways. They are controlled from either platform or floor by pendant push-button stations.

AN AVERAGE of nine 60 ton gondola cars of sand are handled every 24 hour working day with two Cleveland Tramrail Platform-controlled motorized cranes with ½ yard buckets in a large Illinois foundry.

Some of the sand is taken to storage and later transferred to bins. Other sand is taken to storage, then to drier and finally to bins, thus is handled three times with the cranes. As the sand is handled one to three times, it is evident that somewhere between 1000 and 1500 tons are handled every day.

The cranes, which are operated by both men and women, have served in this rigorous work for several years with need of only minimum maintenance.

GET THIS BOOK!

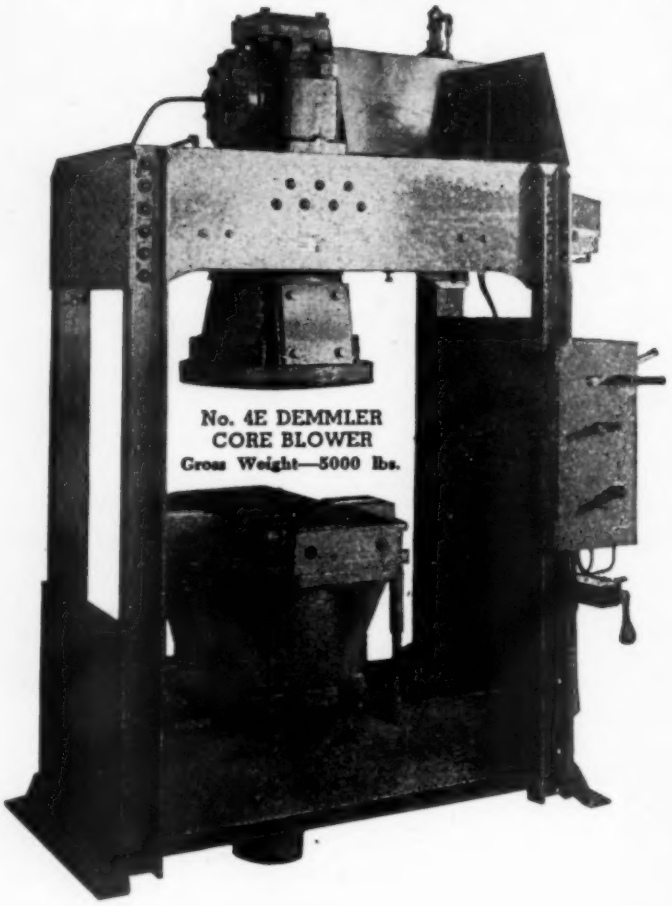
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

★ ★ ★ SINCE 1911 ★ ★ ★

DEPENDABLE **CORE BLOWING** EQUIPMENT



NEW HEAVY-DUTY BLOWER

FOR MOTOR CASTINGS WORK...

Strictly for BIG Cores and Fast Production
Takes Core Box up to 18" x 24"

Designed as a special blower for a leading producer of airplane motor castings, this unit is now offered as a standard Demmler blower. Features include an accurate hydraulic core box draw, table equipped with Timken rollers, 12" diameter throat opening, control mechanism totally enclosed. The height of the frame may be adapted to varying sizes of core boxes.

Reports on this new machine from users indicate that it has unusual possibilities in production of aircraft, tank and truck motor castings. At the present time we can make good deliveries, and invite your inquiries.

WM. DEMMLER & BROS. · KEWANEE, ILLINOIS

CORE BLOWERS *Exclusively*

(*Continued from page* 204)

funny thing about it was that if it was to save his immortal soul, Puss could not repeat the Lord's Prayer and he could not remember from one day to the next whether he should add one shovel or two shovels of coal dust to his little pile of facing sand. He quit the foundry eventually and became a White Wing, a form of occupation in which no mental hazard was involved in connection with the number of shovels lifted per day or per hour.

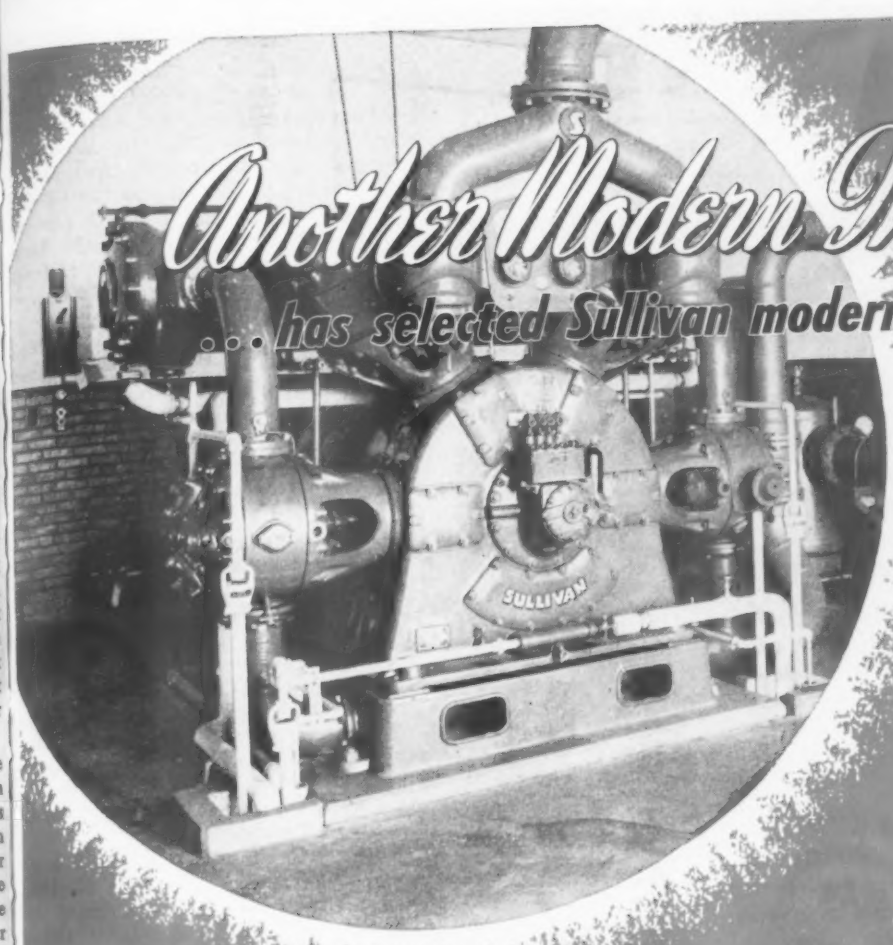
"I memorized two gems in the guide-book and when the autograph album was produced, I wrote either one or the other, depending on —ah—what you might call circumstances. In fact I wrote the things so often I can repeat them down to this day more than 40 years later. The first was a regular knockout: 'You ask me for something original, but I know not where to begin. There is nothing original in me except original sin.' A brief reputation as a wit kind of faded away when the book owners found that the same sentiment had been pinched and utilized by other gay young blades.

"The second gem was a little more elaborate and could be quoted only in homes where the demon Rum and all his satellites were regarded with toleration instead of open hostility. On the other hand, one had to step warily in the home where the old man swilled the stuff openly, but where the remainder of the family was lined solidly in the opposite camp. Listen to this one; 'Here's to the girl I love, I wish that she was nigh. If drinking beer would bring her here I'd drink the you-know-what place dry.'

"Talking about beer," Bill continued, "reminds me of an inquiry I had the other day from—presumably—a young foundryman. He had been told that away back in the dark ages, which of course simply meant a year or two before he squalled his way into the world, beer was one of the usual commodities used in the foundry. Personally, he had the greatest difficulty in believing such an extraordinary statement. He had heard so many queer and curious stories since he started to learn the trade that he never was sure whether his informant was telling him the truth or just taking him for a good natured ride. Apparently, a nice, polite young fellow he did not like to compare his informant with Ananias, you know the champion liar fella, up to the time the present war started. Har, har, Annie does not live here any more!

"Well, anyway, the young man with a touching and highly appreciated confidence in my competence and—er—sterling honesty and all that there kind of stuff, said he would value my opinion. Was it a fact that beer actually was used in the foundry, and if so, what was it used for? Clearly this was a time for all hands to rally around and come to the aid of the party. Light the torch and all that kind of thing to point

(*Continued on page* 208)



Another Modern Industry

. . . has selected Sullivan modern air power . . . .

SPERRY

Thompson Products, Inc.

SOLAR AIRCRAFT COMPANY

BENDIX AVIATION

TUDEBAKER

BELL Aircraft

Airacobras for victory—

LIKE so many other industries that have progressed by the bold and continued adoption of better and better methods, materials and machines, aviation has achieved the impossible in production of military planes. The contribution of compressed air from Sullivan *modern* air compressors cannot be emphasized too highly.

This SULLIVAN WN-114, four cylinder semi-radial air compressor recently installed in the newest plant of the largest aviation company, drives hoists, chucks, and boring mills, cleaning, sandblasting and other air equipment and is used at reduced pressures in the all-important air-flow combustion control systems of the power plant itself. Many other aviation companies have similar installations working continuously.

Sullivan Series 100 Air Compressors are two-stage, double-acting, long-lived, heavy duty continuous service compressors—much more compact than old style compressors of the same capacity and yet have operating economies exceeding older and bulkier units. They are available in two and four cylinder models and in single or twin units with capacities from 378 C.F.M. to 3656 C.F.M.

Sullivan Machinery Company, Michigan City, Ind. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

SULLIVAN

AIR COMPRESSORS FROM 1/4 TO 3,000 H.P.

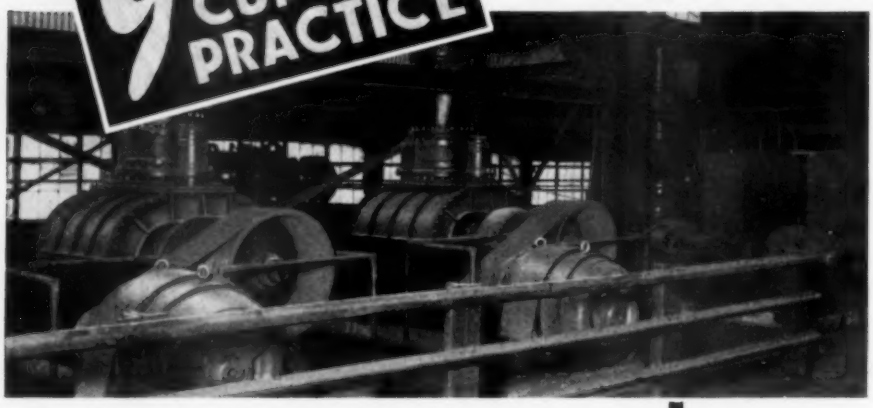
PRODUCTS

Stationary and portable air compressors from ¼ to 3,000 H.P., pneumatic casting grips, foundation breakers, portable hoists, rock drills.

OFFICES { Seattle, Boston, New York, Chicago, Portland, Pittsburgh, St. Louis, Detroit, San Francisco, Birmingham, Knoxville, Huntington, Los Angeles, Duluth, El Paso, Butte, Salt Lake City, Scranton, Denver, Dallas

Good CUPOLA PRACTICE

Photo shows two "R-C" Rotary Positive Cupola Blowers with V-Belt drive by 4-speed motor; installed in a Southern Foundry.



Good cupola practice demands that blowers be used which are capable of delivering the maximum quantity of air that ever will be required in your foundry. They must be able to deliver this air in a positive manner and at a pressure high enough to overcome the maximum resistance that frequently develops in all cupolas.

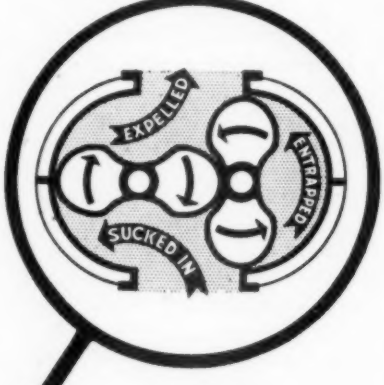
Therefore, in conformance with good cupola practice, it is logical that you should use Roots-Connersville Rotary Positive Blowers. They have the inherent ability to build up pressures to overcome any resistance and to deliver economically maximum quantity of air to meet any condition by simply changing the speed. Their rugged construction and high quality of workmanship enables them to deliver in excess of their rated capacities for short periods, if necessary.

In addition, they are built to give years of trouble-free service. Write for Bulletin 22-B-12.

ROOTS - CONNERSVILLE BLOWER CORPORATION

One of the Dresser Industries

505 Madison Avenue
Connersville, Indiana



POSITIVE DISPLACEMENT

Twin impellers alternately suck in, momentarily entrap, and then expel definitely known amounts of air, resulting in positive delivery of four equal volumes each revolution of drive shaft. Impellers need no seal or lubrication. Capacity varies with speed. Pressure automatically builds up to overcome resistance on discharge side.

Roots CONNERSVILLE SINCE 1854 Positive Displacement CUPOLA BLOWERS

(*Continued from page* 206)

the way and lead the feet of the worthy pilgrim into the true path. Never do to let the canker of suspicion enter his mind and lead him to doubt the word of a brother, a member of the Ancient and Honorable Association of Casters and Founders in Metals, known to one and all as unalterably opposed to levity, horse play, plain or fancy lying, other forms of what passes for humor among members of less worthy occupations."

"I can see the finish," I said. "You jumped with glee into the opening and filled this innocent and confiding young man with a mess of misinformation, compared to which the story of his first informant was the prattling of a babe in arms. For example, you told him—"

"Peace, my good fellow. Less of the clairvoyant stuff, if you please. I told him the truth, the whole truth and—well, maybe—a little more than the truth for good measure. I told him that merely as a matter of historical interest, one might refer, might one not, to the fact that in the so called good old days, beer, or probably suds to you Sir, occasionally was employed in the foundry as a wash and a binder. Although the foundry notoriously is a dry and dusty place, the word *wash* is not to be confused with water.

"Beer diluted with water and holding a small amount of carbon blacking, plumbago or silver lead in solution was applied in dainty and highly skilled strokes with a camels hair brush to the slicked and finished face of a blacked mold. Any on the face of the molder, a direct loss to the foundry proprietor, was considered purely accidental and coincidental.

"Beer diluted with water, but lacking the blacking, also was used as a binding agent in core and sand mixtures, skin dry and dry sand facing. Old dyed in the wool, bottle nose molders refused to use anything else. Claimed they had become accustomed to it when they were serving their time under one of the old legendary foundry gaffers, and since then had used no other. What was good enough for one of the old ramping, stamping bully boys who could run a shop by dead reckoning without chart or instrument, was good enough for them. You could take all your new-fangled fancy stuff and pour it down a rat hole.

"In the oven the useless adulterant water evaporated. The dextrine and other forms of gooey residue dried up and cemented the grains of sand into a compact mass. Occasionally the claim was advanced that the hops in the beer helped the vent to escape, but this may be accepted as a justifiable bit of foundry hyperbole, better known among the elect as baloney.

"As a general rule, and for this purely utilitarian purpose, only stale or sour beer found its way into the foundry. Occasionally, either by accident, design, or crafty collusion and the exchange of a slight financial consideration between

(*Concluded on page* 210)

A view of the Lectromelt composite electro-mechanical electrode arm, showing the power operated clamp which allows the electrodes to be "inched" downward.

Plant view showing size "NT", 15 to 20 ton Lectromelt.

MAXIMUM operating efficiency is assured with Lectromelt Furnaces, because of such features as the power operated clamp on the electro-mechanical electrode arm (Moore Patent). The pneumatic controls of the clamp enables the operator, without leaving the floor, to "inch" the electrodes downward when necessary.

This is not a new development with Lectromelt but has been thoroughly tested and in operation on some installations for years. It is an example of how the broad experience of the world's largest exclusive manufacturer of electric melting furnaces is incorporated in the design and construction of Lectromelt furnaces. Write for complete details.

TOP-CHARGE LECTROMELTS ARE AVAILABLE IN SIZES RANGING FROM 100 TONS DOWN TO 250 POUNDS

MOORE RAPID

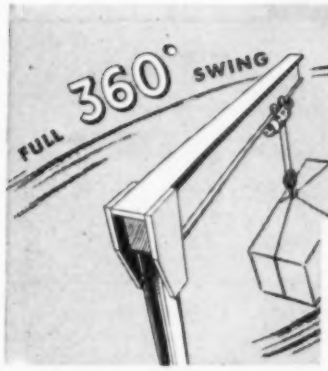
Lectromelt

FURNACES

Engineered by Experience

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH 30, PENNSYLVANIA



CHICAGO TRAMRAIL

JIB CRANES

SPEED

POINT-OF-OPERATION JOBS

YOU SAVE . . . 1. MANPOWER 2. INSTALLATION COSTS 3. COMPENSATION COSTS 4. PRODUCTION COSTS 5. MAN-HOURS

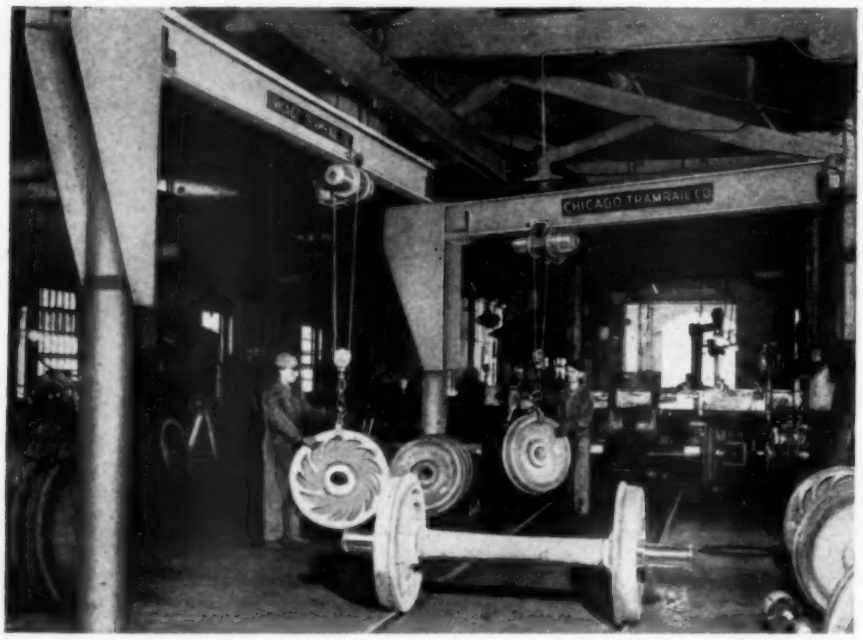
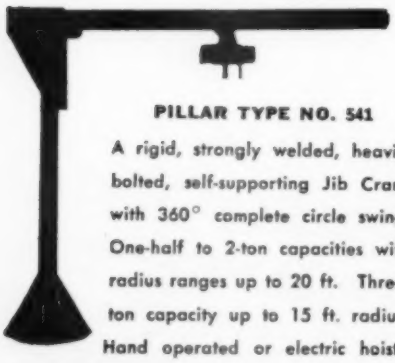


Photo courtesy of Union Pacific Railroad

The assembly of railroad wheel-and-axle units is a job that calls for precise coordination in heavy handling. Too light a job for costly overhead cranes, and too dangerous for all but the most skilled manual labor, it is an ideal application for fast-action, flexible Jib Cranes. Working in conjunction, the two nimble Jib Cranes ease the wheels into place on the axle swiftly and surely, without danger to the delicate bearing surfaces of the axle or journal. This used to be a job for skilled workmen, but now easy-to-operate Jib Cranes take over the difficult task—a real help in these labor-scarce times.

Jib Cranes help to reduce compensation costs because they lessen the probability of accidents that are so frequent in heavy handling. For example; the operation above was formerly a dangerous one. Many strains and broken bones resulted from rolling the heavy wheels into position, but now the men have only to guide the free-swinging Jib Cranes as they swing around, pick up the wheel and carry it to the point of assembly.



PILLAR TYPE NO. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

IN YOUR PLANT

It's easy to see how swiftly, economically and safely Jib Cranes perform the operation illustrated. You can effect these same savings in your plant through the use of Jib Cranes. Look around your plant—you're sure to see many places where the use of these sturdy "mechanical muscles" will save you time and money as well as speed up production. Write for full particulars today. We will be glad to send you an illustrated circular showing the various types of Chicago Tramrail Jib Cranes together with many suggested applications for their use.

WRITE TODAY!

CHICAGO TRAMRAIL COMPANY

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

(*Concluded from page* 208)

molders and beer wagon drivers a barrel of good beer was delivered. Great care was taken to see that none of the precious fluid was wasted in the sand or blacking barrel. Almost by magic and in record time it was drawn off in dinner buckets, water pails, tin cans, empty bottles and swab pots. After the daily heat was poured off in the afternoon, the gang held grimy hands and danced around the empty barrel in a ring singing right merrily and heartily: Here's to the lass I love; I wish that she was nigh. If drinking beer would bring her here, I'd drink the (naughty word) place dry."

GRAY IRON FOR POWER PLANT EQUIPMENT

(*Continued from page* 111)

top in a great number of small streams meets the ideal theoretical conditions. The mold is filled rapidly and uniformly. Solidification begins at the bottom and progresses steadily upward. Fresh, hot metal always is on top as the metal rises in the mold. This is in marked contrast to a condition where the film and, in extreme instances, the crust has to be pushed upward, to find lodgement in the

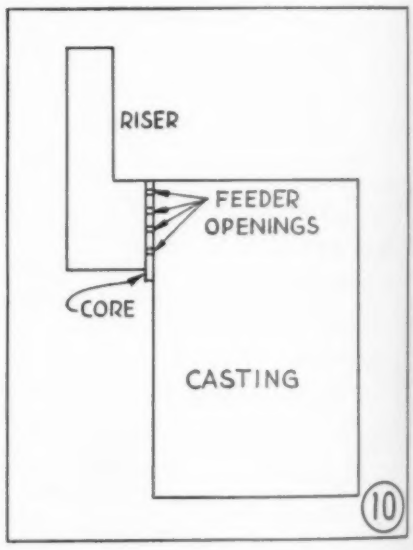


Fig. 10—*Instead of attaching a large heavy riser directly to the casting, contact is effected through a number of small passages through a flat dry sand core*

upper flange when the metal enters the mold through a gate at the bottom or along one side.

Construction of the mold inside a rigid cast iron flask is an important factor in the prevention of shrinkage defect in the casting. A weak mold will yield or strain to some extent when it is filled

(*Continued on page* 212)

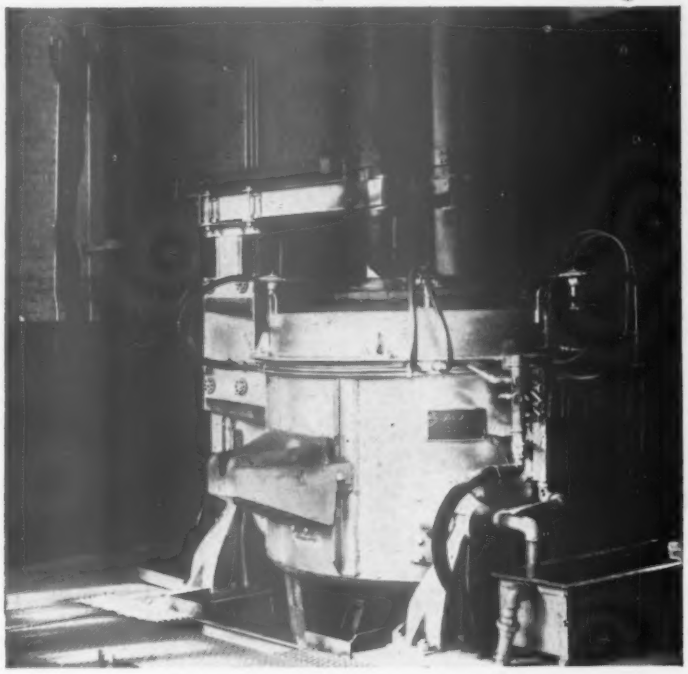
IRONTON CARO-LINE

A Monolithic Lining for

ACID ELECTRIC FURNACES

•

LADLE LININGS IN ALL SIZES



"Ironton Caro-Line" siliceous ramming refractory is being used as a rammed in bottom for acid electric furnaces in some of the most modern iron and steel foundries in this country and Canada. It is usually mixed with 40% ganister of the proper grain size, then rammed in solidly with an air hammer. It is no longer necessary to take the time and use electric energy in making sintered bottoms. It is more easily installed and lasts longer than ganister-clay mixtures.

"Ironton Caro-Line" is also giving outstanding service in ladles handling steel, alloy iron, malleable iron and gray iron. Its high refractoriness and great resistance to slagging reduces the loss of castings due to slag inclusions.

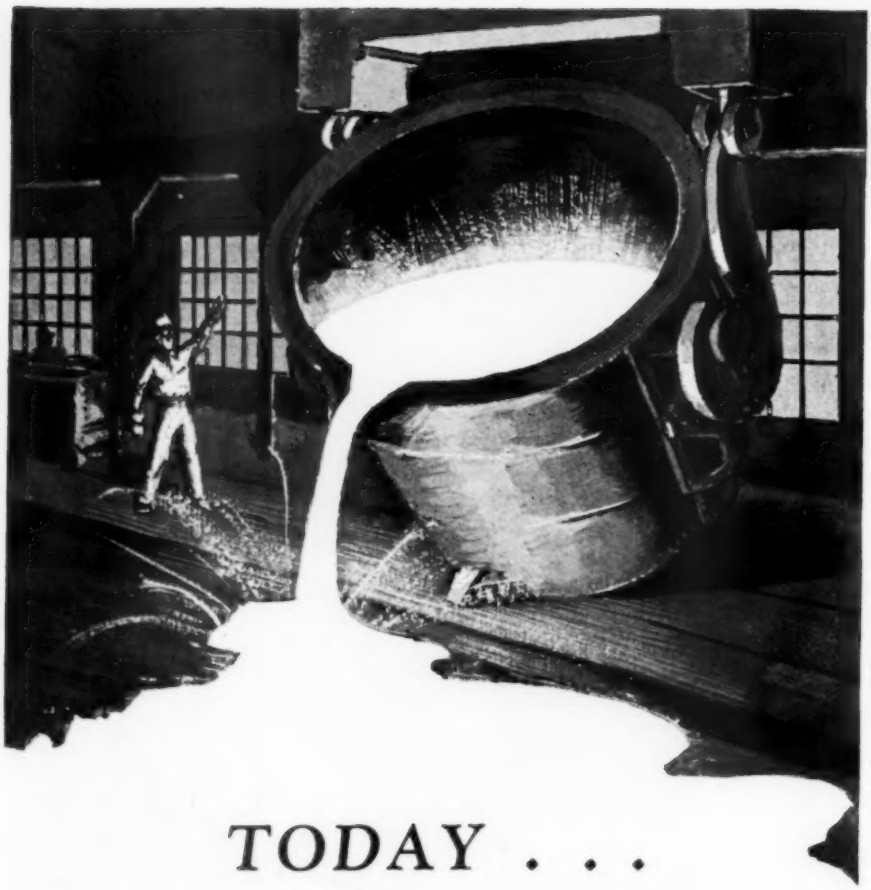
Ask us for additional information on this unusual refractory material.

Address Box 209

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO



TODAY . . .

You Can Order the Quality Alloy You Need!

Call us . . . tell us the specification of the alloy you need, *where* and *when*. We can make deliveries to conform to the most critical production schedules.

The comprehensive files of NIAGARA FALLS SMELTING & REFINING CORP. . . . files of complete, accurate alloy research information . . . are at your disposal. And the technical staff of our modern laboratories is available to help solve your alloy problems at any time.

You are assured of unvarying quality. Every pound of every shipment you receive will be the exact quality you specify.

Eliminate doubt and delay. Be certain you'll meet your production requirements *on time . . . accurately* and *economically*. Call or write America's largest producer of quality alloys.

Our Telephone Number It's Buffalo Riverside 7812-3-4

NIAGARA FALLS SMELTING & REFINING CORPORATION

America's Largest Producers of Alloys

BUFFALO 17, NEW YORK

(*Continued from page* 210)

with metal. As a result, some of the metal sinks toward the bottom and leaves what mistakenly are diagnosed as shrinkage cavities in the top flange. This does not happen in a strong, rigid mold.

A third important factor is the sand. It must be strong, highly refractory and possess maximum permeability. Weak sand will cut or wash under the force of the descending streams of iron. Lumps of this slushy compound of sand and iron float upward some distance and then become anchored against the wall of the mold or core to form a porous area in the casting. Low permeability sand produces a somewhat similar result. Steam and gas that cannot escape readily through the sand produce a boiling action or ebullition in the metal in the vicinity. This boiling action produces a messy area of small and large bubbles or gas holes.

In the present instance the sand which forms the molds is a synthetic combination of silica sand, 36 to 40 fineness, and bentonite. Other physical properties include green strength 10 pounds per square inch and permeability 110. Moisture content in the facing sand is approximately 7 per cent, slightly high for green sand practice, but a good workable mixture where the molds are to be dried.

Use Mechanical Molding

In the central or main bay of the foundry all the large molds are made either in flasks on the floor or in a series of pits on both sides of a central gangway. A large type sandslinger with an arm swinging radius of 19 feet travels back and forth on rails laid in the gangway and packs sand around the various patterns either in flasks or in the pits. A large rectangular hopper on top of the machine carries the sand supply. Two tanks are available. While one is in service on the machine, the other is loaded with sand in a section at the east end of the main bay where all the castings are shaken out and where the sand is reconditioned for further use. All the sand is passed through a vibrating screen and an aerating device which throws it into a pile. In the process all scrap, rods, gaggers, wires, etc., are retrieved and the waste material is removed to the foundry dump. Facing sand containing sea coal is prepared in muller type machine in the vicinity.

An oil sand mixture for all the small and medium size cores is taken in steel boxes from the muller to the benches in the core room. The amount of oil and, in some instances, cereal binder varies to some extent depending on the shape and size of the cores and the positions they occupy in the mold. The venting feature is negligible in some instances, while in others this feature is the most important. Elaborate precautions including the placing of wax vents are necessary to insure an unobstructed passage for the gas generated when the core, with the exception of one or two out-

(*Concluded on page* 214)

Sterling

"THE WHEELS OF INDUSTRY"

Accurate and Dependable on Every Grinding Job!

The extra cutting action and long life of Sterling's "Wheels of Industry" is the result of sixty years of experience on literally hundreds of thousands of grinding jobs. The unusual demands of today's production yield to the high quality to be found in every Sterling Grinding Wheel.

Give new life to your schedules by placing on your machines these wheels that have been built to new standards of perfection and performance.

Sterling's Specification Selector will help you find the correct wheel for hundreds of wartime jobs.

Send for this valuable, pocket-sized production aid today.

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

FULLER ROTARY COMPRESSORS
BUILT FOR CAPACITIES TO 18000 C F M PRESSURES TO 125 LB VACUUMS TO 29.00 IN REFERRED TO 30 IN BAROMETER
AND VACUUM PUMPS
"SPOT" YOUR COMPRESSORS
FULLER
FULLER COMPANY

Why — long distance pipe lines and their attendant losses and upkeep?

Locate your compressors in the departments where air is required. Eliminate the cost of long distance pipe lines, consequent leaks, upkeep, and accompanying line friction losses.

With compressors "*spotted where you need the air*", they can be shut down when the various departments have completed their daily cycle of operations. This means a saving in power, supervision, and maintenance . . . in many cases has paid for the installation in a comparatively short time.

Bulletin C-5 illustrates and describes these machines. It's yours for the asking.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

Chicago 3 · 1144 Marquette Bldg.
San Francisco 4 · 421 Chancery Bldg.
Washington 5, D. C. · 618 Colorado Bldg.

No. 3 of a series

C-111

FULLER
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

(*Concluded from page 212*)

lets, is entirely surrounded by molten metal.

The circular jacket core for a supercharger shown in an accompanying illustration is fairly typical of this class of cores. The wood corebox is in two parts, the main part for forming the outside, and the inner or loose part for forming the inside face of the comparatively fragile shell ½ to ⅝-inch in thickness. The operator packs sand by hand against the outside face to the approximate thickness required. He beds in the reinforcing wires vertical and horizontal, also a number of wax vents with the upper ends in the small core prints. The loose inner part of the box then is placed in position and sand is rammed in the narrow space between the inner and outer parts of the box. The inner part of the box is removed and the entire cavity filled with molding sand. Then a plate is clamped on and the assembly is inverted and the corebox is removed to leave the thin shell core supported by the inner mound of black sand. The cores are not made in sufficient number in any one size to warrant the expense of making the inner part of the box in metal to be left in place until the core is baked.

Increase Amount of Binder

Large cores are made from a core sand mixture approximately the same as that used for mold facing sand, with the exception that the amount of the binder material, a pitch base proprietary compound, is increased to a slight extent. In some instances the cores are made in coreboxes and rolled over on to the planed, rigid core plates. In other instances a skeleton frame is placed on the plate and the sand is rammed inside and then brought to the correct outer contour with a number of short *strikes* resting on the ribs of the skeleton. Large cores are packed full of coke for the double purpose of reducing the amount of sand, and to improve the permeability and collapsibility of the core. Incidentally, this form of construction reduces the amount of fuel and the time required to dry the core in the oven.

A special device shown in an accompanying illustration is employed for handling large cores and plates. The device includes a four-way cross with loop for attaching the crane hook in the center. Four long steel rods suspended from the cross take the place of the usual slings. Each rod has a turnbuckle in the center for making any necessary adjustments to meet minor differences of distance or weight of the load. Notches in the upper face of each cross arm permit adjustment of the rods within any distance up to 5 feet from the center. An eye on the lower end of the rod is attached to a lug on the core plate by a steel pin.

(*To be concluded next issue*)

Arrow Pattern & Foundry Co., Chicago, has started construction of a one-story, 50 x 132-foot plant addition.

DUST... *insidious enemy of workmen and work...*

PERMANENTLY PUT OUT OF CIRCULATION... *under water*

with the MAHON Hydro-Foam SYSTEM of dust elimination

Even the finest dust particles—the most dangerous to workmen and work—are captured and permanently trapped under water. This is how the mechanism works. By means of a powerful suction-exhaust fan—the only moving part—dust-laden air is automatically drawn from working areas into the Collector, where the air stream, directed downward at high velocity, carries the heavier dust particles into the solution in sludge tank located in the base. This impinging action of air stream against the sludge tank solution aereates the solution and forms a bed of foam above the water line. As the air stream passes through this foam bed the more minute dust particles are "smothered" and settle to the bottom of sludge tank with the heavier dust previously removed. Clean air only is exhausted from the Collector.

- AUTOMATIC OPERATION
- NO PUMPS
- NO CLOTH SCREENS
- NO SPRAY NOZZLES
- NOTHING TO WEAR OR REPLACE

Write for descriptive folder

REMOVES THE DUST FROM INDUSTRY

THE R. C. MAHON COMPANY

DETROIT 11 — CHICAGO 4

Designers and Manufacturers of Metal Cleaning Machines, Rust Proofing Machines, Hydro-Filter Spray Booths, Ovens of All Types, Filtered Air Supply Systems, Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems.

APPLIES WARM WATER

In Blasting Cores from Castings

By RICHARD W. VOSLAMBER
Maintenance Superintendent
Clark Bros. Co. Inc., Olean, N. Y.

A DOUBLE problem turned into a boon at Clark Bros. Co. Inc., Olean, N. Y., one of the Dresser Industries, as engineers sought a means of eliminating a foundry dust hazard created during hand removal of large cores from compressor and diesel engine castings. At the same time, in another part of the factory, there was the problem of what to do with spilloff water from power house engines used to generate current for plant operations. Geography of the factory site and distance from the storm sewer in a nearby street made pumping necessary to get a flow from the boilerhouse to the sewer.

Why not, reasoned Clark engineers, install a hydroblast system to clean cores from castings, pumping the spilloff water from the boilerhouse to the cleaning room and sending it from there to the sewer. Such a step would have two advantages. First, it would re-utilize water purchased from the municipality, thereby spreading its cost over wider factory operations, and second, because the water had been warmed by being circulated through the water jackets of the boilerhouse engines, it would provide greater comfort for the hydroblast operator, especially in wintertime when a cold spray would be extremely uncomfortable. Both advantages were in addition to the primary objective of eliminating dust conditions during the casting cleaning operation. The hydroblast method knocks cores and loose molding sand from castings with a stream of mixed water and sand shot from a nozzle under 1100 pounds per square inch pressure.

At Clark Bros., boilerhouse engine spilloff water is collected in a well and from there pumped to the hydroblast unit in the cleaning building. The latter is adjacent to the foundry building and houses an open-roofed, corrugated sheet metal room with double swinging doors at each end. Castings are brought to this room by overhead crane or on skid-trucks after having been taken from the mold. More than 40 tons of castings, ranging in size from huge 7-ton crankcases down to small piston parts, go through the cleaning process each day.

At the unit the warm spilloff water is collected in an accumulator equipped with float control valves which serve two purposes: If the level of water in the accumulator tends to fall off, city water is admitted; if the level tends to increase, the surplus is allowed to spill over into lines leading to the storm sewer. Through normal operations temperature of the water remains at about 100 degrees.

From the accumulator, where an airhead of 35 pounds per square inch is maintained, pipes carry the water to high pressure pumps. These deliver water at 1100 pounds per square inch pressure to the lightweight gun carried by the operator.

Entrained sand picked up through a separate hose by the suction created by the high velocity nozzle, is blasted from the gun. Mixed with the ⅜-inch water stream, the sand cuts its way through baked cores with ease. The hydroblast system eliminates dust and has the added advantage of superior cleaning qualities at points of difficult accessibility. Action of the sand and water on the casting's surface also has a slightly abrasive function with a resulting tendency to produce a cleaner finish.

Once cores have been removed, the casting can be pressure-hosed with clear water from the same nozzle by shutting off the sand supply. Such a step cleans the casting of grit particles which would be injurious to cutters during subsequent machining operation. Normally this final wash is performed after chipping operations which remove mold lines or sprue and riser marks.

Warm water from boiler spilloff provides comfort for operator during coldest weather

The floor of the hydroblast unit is a grating which allows small core chunks, sand and water to fall through into a pit whose bottom is a vibrating screen. Here sand and water flow to a collecting bin and nails, coke, stray iron or other core material remain behind, to be shaken into a scrap box easily accessible for cleaning. A pump then forces the screened sand and water to a conventional hydraulic separating cone at the top of the hydroblast unit. After separation, the sand is returned to a bin for re-use and the clear water is carried to the sewer.

Water and sand drop through grating floor in cleaning unit and are pumped to separating cones at top right for separation and reuse

Opens New District Offices

American Machine & Metals Inc. has opened new district offices in Dallas, Tex., Minneapolis, and Philadelphia. Oliver H. Castle is in charge at Dallas with headquarters in the Mercantile Bank building. G. W. Johnson heads the Minneapolis office in the Foshay Tower building. Harold N. Ewertz is manager at the Philadelphia office in the Philadelphia Savings Fund Society building. Divisions of the company which will be under the supervision of the new district managers include Troy Laundry Machinery, DeBothezat Fans, Tolhurst Centrifugals and Riehle Testing Machines.

You can't find it all in books!

GRINDING has become an exact science. And so, much of the standard information users of abrasives need to specify the right abrasive for the job *can* be found in the books—notably "GRINDING FACTS" by "CARBORUNDUM." Nevertheless, industrial grinding techniques advance so fast these days, the books can't quite keep up. If you have an abrasive problem that cannot be solved by the standard pattern, call a "CARBORUNDUM" Representative. He has access to the latest information from other users and from the "CARBORUNDUM" laboratories.

And there are always the "CARBORUNDUM" Abrasive Engineers. These are the men who know abrasives and their uses from the inside out. They have helped originate many of the present-day standard grinding techniques. They can sit right down with you at the planning stage and help you work out your problems from the start, as they have done for many manufacturers. For the solution to all your abrasive problems consult your "CARBORUNDUM" Representative. He will be glad to be of service. Write to The Carborundum Company, Niagara Falls, New York.

THERE IS A PRODUCT BY

CARBORUNDUM

TRADE MARK

FOR EVERY ABRASIVE APPLICATION

"CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company

CENTRIFUGAL CASTING SPEEDS

(*Continued from page* 100)

where N is the speed in revolutions per minute and D the diameter of the casting in inches. The curves plotted in Fig. 5 show this relationship and for 200 and 300 times that of gravity in addition for varying casting diameters. It is intended that this relationship should be used for thin walled castings only, where the difference between the outside and inside diameters is not too great.

For instance, if a casting requires a finished bore of 2 inches, a speed of 1900 revolutions per minute would be chosen; but if this casting had a flange 6 inches diameter, it would be necessary in the interests of safety to drop to lower speeds, even if this resulted in greater taper in the bore. The same diagram (Fig. 5) enables a comparison to be made between this relation and the alternative of a constant peripheral speed at either 1700 or 1200 feet per minute. The differences are substantial and the author, while agreeing that speed variations of the order of 10 per cent or thereabouts are unimportant, states that by operating as close to 100 G. as is practical, they have obtained their best results and that operating at speeds greater than 100 G., no improvements have been obtained.

Janco[19] records his findings that in actual practice the amount of taper in the bore of the casting cannot be reduced materially by rotating at speeds of over 1500 feet per minute. These speeds are somewhat lower than the 100 G. relationship above. In the production of thick heavy slush pump liner castings 8½-inch diameter, Falk[20] records that a speed of 600 revolutions per minute (1340 feet per minute) was used. It was stated also that higher speeds were used formerly, but the lower speeds were found better, as giving a longer mold life.

The author has previously given a minimum speed condition of 1200 feet per minute peripheral velocity as being used in the production of cylindrical castings such as cylinder liner and piston ring drum by rotation about the horizontal axis. This recommendation was based on experimental work in the production of such castings in cast iron operating with hot cast-iron dies having an internal surface temperature of approximately 550 to 600 degrees Cent., and pouring with a tilting trough type of pourer spout. The guiding principle in the adoption of this value as an approximately constant peripheral velocity was the securing of uniform radial wall thickness or internal bore diameter rather than the achievement of a constant centrifugal force over the range of sizes of castings, viz., from about 3 to 12 inches outside diameter.

Determine Rate of Speed

From a number of experiments made at the time it was found that under the particular conditions, a speed of less than 1000 feet per minute was insufficient to accelerate the metal quickly enough, and above 1200 feet per minute little further improvement in uniformity of radial wall thickness was secured. Under somewhat similar mold conditions, but operating with the helical edged type pourer spout pouring castings 36 inches diameter and 12 feet in length, a speed of 166 revolutions per minute was found to be necessary uniformly to accelerate the molten metal and to obtain satisfactory dimensions. This corresponds to a peripheral velocity of 1500 feet per minute.

For sand lined molds in the Moore sand spun process, Donoho[21] recommends the general rule propounded by Cam- [illegible] to use a spinning speed which will give a centrifugal force of about 75 times gravity. A simple formula is:

$$N = \frac{1675}{\sqrt{R}}$$

Where N = revolutions per minute and R the radius of the casting in inches. A casting of 6 inches diameter will require a spinning speed of 967 revolutions per

(*Continued on page* 220)

SCHUNDLER
BENTONITE

- A laboratory controlled, first quality product especially "tailored" for Foundry Use
- Offered by a pioneer producer

- Sold with a complete technical service . . . available on request . . . fitted to your individual needs
- Stocks located in principal cities

F. E. SCHUNDLER & CO., INC.
520 RAILROAD STREET • JOLIET, ILLINOIS
SCHUNDLER
BENTONITE

Specify

S-G

Aluminum ALLOY INGOT

QUALITY INGOT
for every type of casting

•

CONTROLLED UNIFORMITY
TO YOUR SPECIFICATIONS

Today for WAR

Tomorrow for PEACE

SONKEN-GALAMBA Corporation

Riverview at 2nd Street · Kansas City 18, Kansas

(Continued from page 218)

minute, or for a 12-inch diameter casting the speed will be 684 revolutions per minute. The records of the casting of 30-inch diameter pipe at Acipco by this process record a speed of 403 revolutions per minute, coinciding approximately with the above formula. Those speeds respectively correspond to peripheral velocities of approximately 1500, 2150 and 3200 feet per minute. These values refer to the sand spun process, in which the sand lined mold is continuously rotated about the horizontal axis and the molten metal fed to the rotating mold by means of a pourer spout.

It is recognized that in metal mold spinning the speeds used may be somewhat lower since the enhanced cooling effect of the mold causes the metal to pick up more readily than in a refractory mold. For very thick castings in sand lined molds the initial spinning speed is often slightly increased beyond that calculated from the above formula in order to pick up the large volume of metal quickly. For castings such as flanged castings, where the maximum outside diameter is very much greater than the inside diameter, the spinning speed may be a compromise so as to obtain a sufficiently high force on the inside diameter and yet not excessive on the maximum outside diameter. Excessively high spinning speeds will tend to cause longitudinal hot tears by reason of the stress developed by the centrifugal force as the casting freezes and shrinks away from the mold wall.

The production of cast-iron soil pipe by spinning in sand-lined molds rotated about the horizontal axis has been described by Farr.[20] In this process a 4-inch diameter standard pipe is produced at a speed of 750 revolutions per minute. This is equivalent to a rotational velocity of approximately 750 feet per minute—a speed substantially lower than recommended by Donoho. It is stated that this speed gives an acting centrifugal force of about 1½ pounds per square inch. Soil pipe is substantially thinner than cast-iron socket pipe, and the standard U.S.A. thickness for the three grades of standard, medium and extra heavy are ⅛, 3/16 and ¼ inch. The 4-inch pipe described has a total weight of 32 pounds. It is probable that the comparatively rapid rate of solidification of such pipe, even in sand molds, and the small volume of metal necessary to accelerate, makes it unnecessary to use higher speeds of rotation. In a description of the sand-spun process by Moldenke[23] a slightly different formula from the above is given, *viz.*, $N = \frac{1550}{\sqrt{R}}$, where R equals the inside radius in inches.

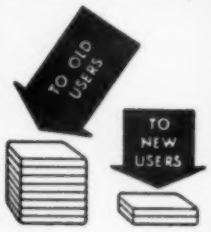
Experience in the casting of various nonferrous alloys by rotation about the horizontal axis has been recorded by various investigators and references to rotational speeds adopted are available. Chester Clark (*ibid*), in casting cupronickel shell bands 14 inches diameter (whether internal or external is not stated), used a speed of 1050 revolutions per minute, corresponding to an approximate peripheral velocity of 3850 feet per minute. Dreher,[24] in the casting of aluminum bronze, recommends a high speed achieving pressures of the order of 66 pounds per square inch, and Meckel,[25] in the casting of white metal bearings, has found the following relation between speed of rotation and bearing diameter to give satisfactory results, *viz.*, $N = \frac{1600}{R}$, where R equals the radius of the bearing in centimeters. In the casting of monel metal using metal molds and a spout type pourer with mold temperatures of the order of from 300 to 450 degrees Cent., the author has obtained generally satisfactory results with speeds corresponding approximately to a peripheral velocity of 1200 feet per minute.

In the centrifugal casting of steel, Cammen (*ibid*) recommends speeds determined by the relationship previously mentioned. In a later paper[26] on the same subject he proposes a slightly different relation. $N = \frac{1750}{\sqrt{R}}$, where R is the radius of the casting in inches. For the casting of tubes of small diameter and also small thickness, or for diameters larger than 7 inches and practically any thickness, this formula may be

(Continued on page 222)

USERS COME BACK FOR MORE!

8 OUT OF 10 TRANSITE CORE PLATE USERS ARE REPEAT CUSTOMERS!



IT'S EASY to figure out why—once they give Johns-Manville's Transite Core Plates a try—foundries keep coming back for more. Here are the answers:

Light Weight: Transite Core Plates light weight means easier handling, increased production.

Less Breakage: Their fibrous nature provides unusual shock resistance, minimizes breaking and cracking.

Easily Cleaned: Transite Core Plates are actually self-cleaning when both sides are used alternately.

Economical: These J-M plates combine low initial price, low handling costs and long life.

Low Warpage: Maximum warpage on plates under 24" is 1/64" on either dimension. On plates over 24" warpage will not exceed 1/64" in 24" length and width.

Corrosion-Resistant: These Transite plates are made of an asbestos and cement combination. They cannot corrode.

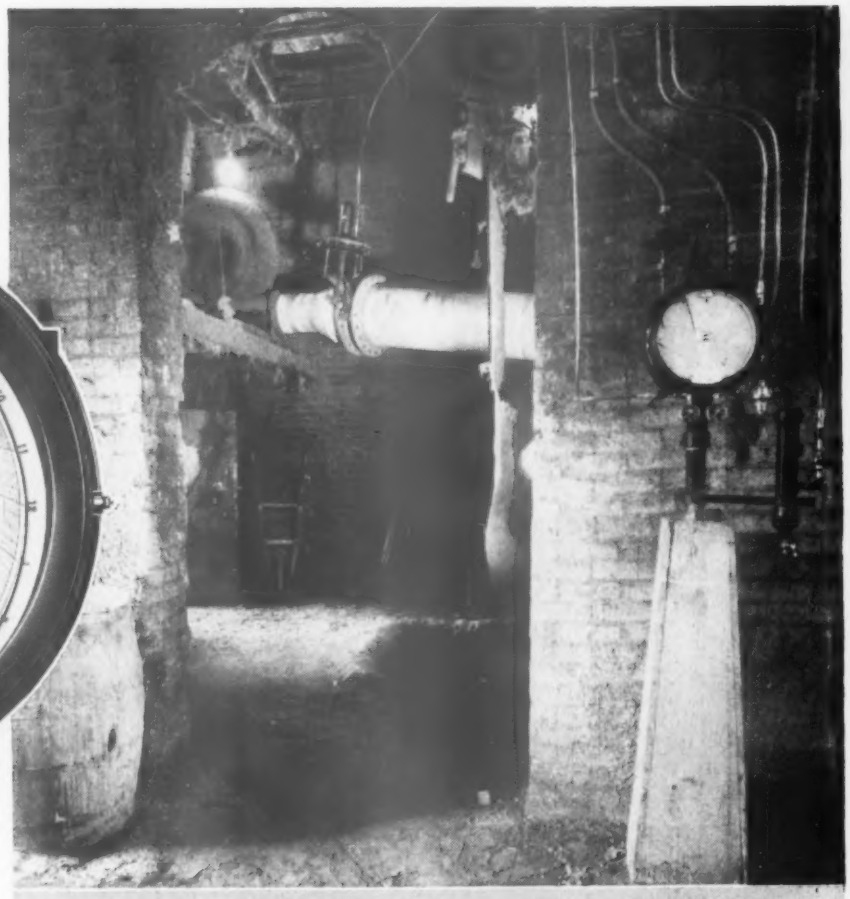
Non-Metallic: No critical materials used.

For full details, write for Brochure PP-10A. Johns-Manville, 22 East 40th Street, New York 16, New York.

JM Johns-Manville

TRANSITE Core Plates

WHY WEIGH IRON AND COKE... BUT "Guess" THE AIR TONNAGE?



Simple Foxboro Air-Weight Control installations like this often increase cupola output ½ to 1 ton daily!

Get better combustion — better heats — with automatic Air-Weight Control!

The air that's blown into your cupola is as important a part of the charge as the iron and coke. For, it takes approximately *a ton* of air to melt each ton of iron in any heat!

That's why you can get almost unbelievable improvement in your production by installing a Foxboro Air-Weight Controller. This automatic instrument exactly controls the blast by *weight* of air, instead of volume.

Foxboro Air-Weight Controllers automatically correct for changes in the weather . . . supply a measured *weight* of air regardless of changes in barometer, air blast temperature, or wind-box pressure . . . maintain uniform melting conditions day-in day-out. Heats are uniformly hotter, without burning. Pigging is entirely eliminated. Every pour gives flawless, quality castings from the first tap to the last.

Write for Bulletin B-268 containing full details of this easily-installed production-booster. Ask for names of users in your vicinity. **The Foxboro Company, 32 Neponset Avenue, Foxboro, Mass., U. S. A.**

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

(*Continued from page 220*)

employed. Where the thickness of the tube is material, the inside radius should be used for purposes of calculation. These recommendations are concerned with the spinning of steel in hot metal mold. The production of cylinder barrels for aircraft engines in steel mold at Ford's is operated at peripheral speeds of 1000 to 1750 feet per minute, calculated on outside diameter of casting.[26] In his process for the casting of steel tire blanks, McConway[27] operated his machine at a peripheral velocity of approximately 65 feet per second (3900 feet per minute). For an outside diameter of tire blank of 30 inches this equals a speed of rotation of 1560 revolutions per minute. This high speed was probably determined by the large volume of metal required in tire blank castings. Earlier workers in this field of centrifugally casting steel ingots recommended a high speed of rotation, as for example Carney,[28] who recommends a peripheral speed of 3000 feet per minute.

The very great importance and relationship of the pouring conditions to the speed of rotation are recognized by the firm of John Brown[29] *et aliter* in their British patent relating to a process for the production of large drums in steel. In this machine a reciprocating type pourer spout was used and it is recorded that the speed of rotation of the mold is dependent upon the diameter of the mold and the rate of flow of metal. In an example of a steel drum casting, 50 inches diameter, a rotational speed of 220 revolutions per minute is recommended for conditions of molten metal delivery at the rate of 8736 pounds in 102 seconds. Incidentally, this metal was introduced through a pourer spout with five 1¼-inch diameter nozzles. The above speed corresponds to a peripheral velocity of approximately 2900 feet per minute and the pouring rate 112 pounds in 1.31 seconds, or 86 pounds per second, approximately.

In the Lavaud process for the production of cast-iron pipe, the relationship between rotational speed and the pouring conditions are completely interdependent. Water-cooled metal molds are used, arranged to rotate about an axis slightly inclined to the horizontal and molten metal is introduced to the rotating mold in the form of a stream of narrow width issuing from the end of a stationary pouring trough the full length of the mold. When these conditions are established, the rotating mold of the order of 20 feet in length is allowed to move in a direction parallel to and away from the end of the pourer spout. In this manner, and by reason of the relative longitudinal movement between the mold and metal stream, the whole rotating surface of the mold is covered with molten metal. In this arrangement it will be appreciated that, operating with a mold of given outside diameter, the uniform radial wall thickness or internal diameter of the casting required will be determined by the quantity of metal flow, the width of the metal stream, the rate of longitudinal travel of the mold and its speed of rotation. For a given rate of metal flow and stream width it becomes necessary to synchronize the longitudinal movement and the speed of rotation of the mold.

Eliminates Spiral Markings

The investigations of Dr. Pardun[30] on a machine of this type producing castings 17 feet in length, 12 inches internal diameter and 0.5 inches radial wall thickness, showed a minimum speed of 400 revolutions per minute (1260 feet per minute) to be necessary to eliminate spiral markings from the surface of the castings. These spiral markings are due principally to the relation between the lead in the longitudinal traverse of the metal stream and the speed of rotation and a critical speed can be regarded as that at which one revolution is completed in the time taken for the longitudinal travel to equal the stream width. Under the conditions of Pardun's experiment, the above speed was considered to be the critical, and a speed in excess of this was necessary to ensure overlap of the deposited metal stream and the elimination of the spiral markings.

In these same investigations, Pardun also found that the minimum speed at which molten iron failed to be picked up was 240 revolutions per minute, or 753

(*Continued on page 224*)

SAHARA & REXALL

Best for Hot Sand and Castings for many years.

Ask the maintenance superintendent in any large low production cost foundry. If he has tried these special Belts they will be standard equipment.

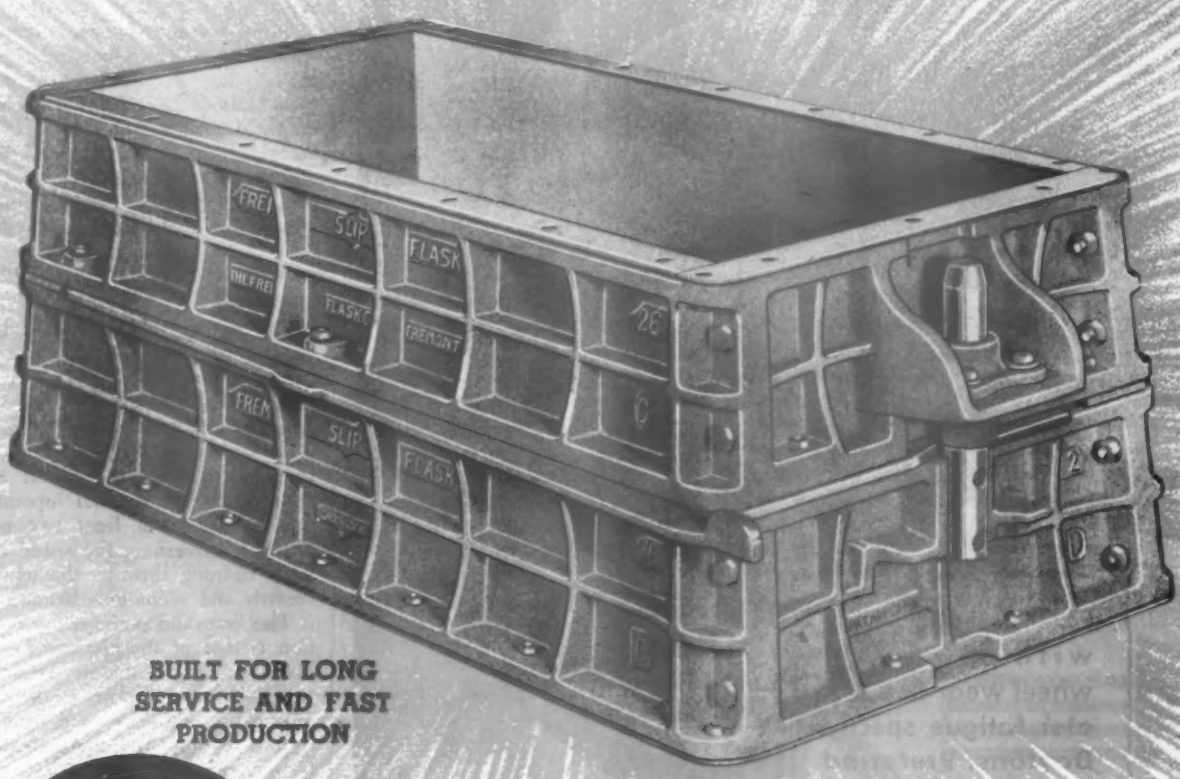
Prewar quality—No Synthetics —Prompt deliveries.

IMPERIAL BELTING COMPANY

1750 S. KILBOURN CHICAGO 23, ILL.

STURDY! LIGHT! ACCURATE!

FREMONT MAGNESIUM FLASKS



BUILT FOR LONG SERVICE AND FAST PRODUCTION

GROOVLOCK
THE FOOL-PROOF PIN

THE FREMONT FLASK CO.,
Fremont, Ohio

(*Continued from page 222*)

feet per minute. These experiments all relate to cast iron using water-cooled metal molds as in the Lavaud system. The area of the mold surface in the production of large diameter castings is such as to present a large amount of mold surface to be covered with liquid metal. According to the quantity of metal delivered by the particular pouring device adopted and its rate of acceleration, it will be appreciated that the initial layers of molten metal can be extremely thin. These circumstances frequently account for surface defects. They can be avoided by the adjustment of the speed to enable substantial quantities of metal to be accelerated. An alternative method is to begin pouring with the mold at rest until enough metal has been introduced to provide a thick enough initial layer, after which the mold can be rotated and brought up to the desired speed.

The machines designed for the operation of the semi-centrifugal and pressure casting processes for the most part rely on the use of sand molds, and in general operate at somewhat lower speeds than those already described. The process adopted by the Ford Co. in America as described[21] may be regarded as within the category of semi-centrifugal processes. This process for the production of gear-wheel blanks for motor trucks at first operated at speeds of from 400 to 1800 revolutions per minute. Later it was found that speeds of 600 to 800 revolutions per minute proved just as satisfactory. Operation began with these higher speeds, but later it was found that the lower speeds gave the best results with the minimum strain on the machines. In the description referred to, what is described as the truck ring gear is spun at 190 revolutions per minute, and the smaller car ring blank at 325 revolutions per minute. In the case of the transmission cluster gear, with its still smaller perimeter, a speed of 400 revolutions per minute is adopted.

A number of processes operating in America utilize machines covering speed ranges from 50 to 450 revolutions per minute. In some cases the technique of centrifuging after filling the mold has been developed, and speeds of rotation are so controlled as to give peripheral speeds of between 450 to 600 feet per minute. In one example quoted, gear blanks averaging 24 inches diameter are produced at a rotational speed of 92 revolutions per minute. An example of pressure casting operating at the Wehr Steel Co. has been described.[23] Cluster type molds are cast made up in cores assembled in flasks about 20 to 30 inches diameter. Rotated about the vertical axis the average spinning speeds vary according to the type of casting from 154 to 250 revolutions per minute. The adaptation of the centrifugal process to the casting of jewelry in low melting point alloys using rubber molds as recently described[24] is a form of pressure casting. In these processes peripheral velocities are used of 3600 feet per minute, calculated on the maximum diameter of the mold cavities about the axis of rotation.

Two Notions Exist

The author has attempted to review the conditions of rotational speed adopted in the various types of centrifugal casting processes which have been proposed or adopted commercially. It is evident that in each type of process differences exist in the speed conditions adopted by individual operators. In spite of these, at least two notions of principle governing the speed conditions exist, running through the whole of the records and recommendations.

The first, and perhaps the earliest, notion is that of the choice of a speed to obtain an approximately constant condition of tangential or centrifugal force during rotation. The predetermined conditions of tangential force recommended have been fixed somewhat arbitrarily, but in general based upon practical experiment. They are variously expressed as indicated in the paper, and under these conditions it will be appreciated that the peripheral velocity will vary with the diameter of the castings. The density of the molten metal is also a factor in these considerations.

An alternative notion is that of the choice of a speed of rotation to conform to a uniform predetermined periph-

(*Concluded on page 226*)

DAYTON
SNAGGING WHEELS

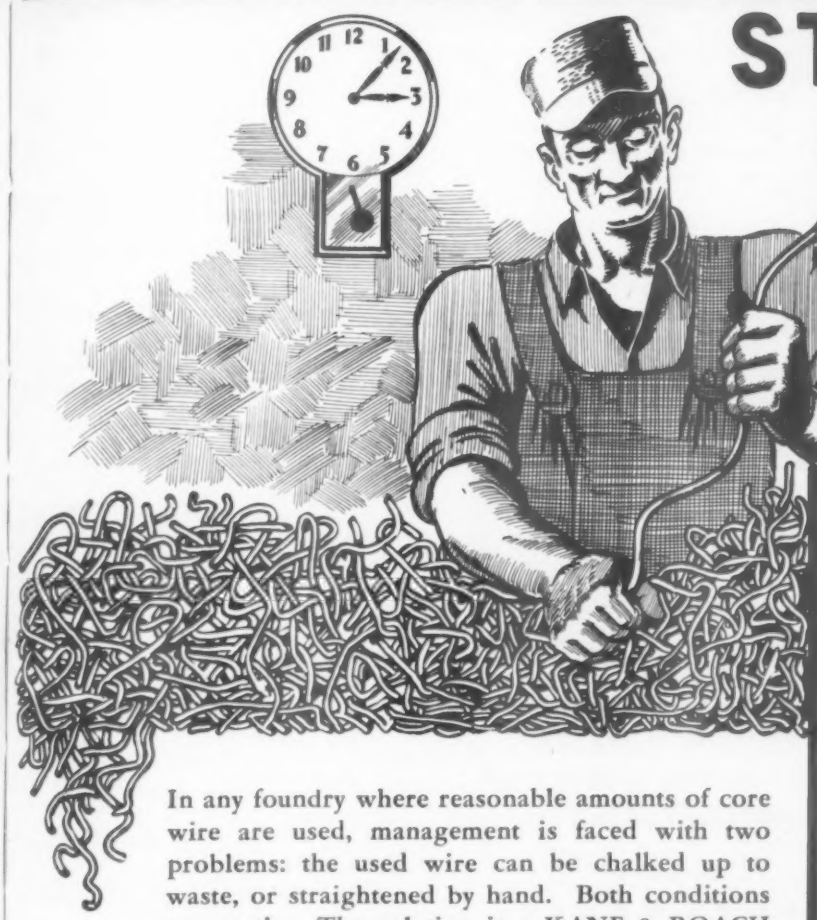
For fast snagging with minimum wheel wear or operator fatigue specify Daytons. Preferred by hundreds of steel and gray iron foundries from coast to coast for years.

SIZE, SHAPE, GRAIN AND GRADE REQUIRED.
WRITE, PHONE OR WIRE.

SIMONDS WORDEN WHITE CO.
710 NEGLEY PLACE, DAYTON 7, OHIO

Are you paying your coremakers a high hourly rate to **MAKE CORES** . . . . . or to

STRAIGHTEN WIRES?



DX 5-Roll Core Wire Straightener

In any foundry where reasonable amounts of core wire are used, management is faced with two problems: the used wire can be chalked up to waste, or straightened by hand. Both conditions are costly. The solution is a KANE & ROACH CORE WIRE STRAIGHTENER. It reclaims used core wire quickly, cheaply and efficiently, over and over again, just as long as the wire remains usable. Foundries in which they are installed report an average saving of $100. a month in total salvage and man hours, not to mention increased production. Machines can be furnished in two sizes with 5, 8 or 9 rolls. Capacity DX Machine—1/8" to 3/8": F Machine—3/16" to 3/4". A Shear can be furnished for use with this Straightener for straightening and cutting new coil stock to length. Because we have been building and designing Straighteners since 1887, we feel that our knowledge and experience may help you. We will be pleased to send you specifications and other data on request.

K & R

KANE & ROACH

INCORPORATED

SYRACUSE, N. Y.

ESTABLISHED 1887

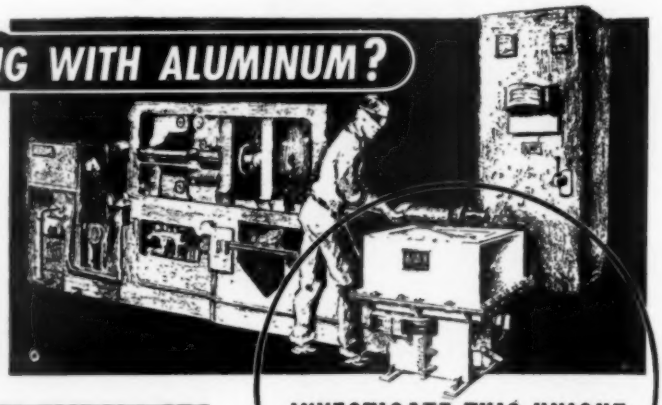
(*Concluded from page 224*)

eral velocity. Here again the predetermined velocity has been based upon practical experiment and has been governed by some such consideration as the uniformity in radial wall thickness or by some relationship to the pouring considerations. The rotational speed, in that it plays an important part in the acceleration of the molten metal delivered to the mold, depends very frequently on the method and conditions of pouring, the nature of the mold and the characteristics of the liquid metal. It is such considerations which account for many of the differences in speed conditions adopted by individual processes. In the case of true centrifugal casting about the vertical axis, a substantial increase in the theoretical speed calculated to give a required internal form in bronzes has been found necessary. The differences in speed requirements consequent upon the use of metal molds as opposed to sand molds in rotation about the horizontal axis has been observed, and attention has been drawn to the interconnection between the conditions of pouring in so far as velocity, rate and direction are concerned and speed of rotation. In the case of semi-centrifugal and pressure castings, in general, lower speeds of rotation are used. In these cases the characteristics of the mold are of considerable importance in determining the maximum speed that can be adopted with safety.

References

13.—Billand Process. *Die Giesserei*, No. 17, 1930.
14.—F. W. Rowe. *Journal*, Institute of Metals, No. 2, 1926.
15.—R. C. Stockton. *Metal Industry*, July 31, 1936.
16.—German patent No. 603,243. Hundt and Weber, April 14, 1932.
17.—Zaiser. *Iron Age*, Aug. 8, 1940.
18.—Zuehlke. THE FOUNDRY, October, 1942.
19.—Janco. *Iron Age*, April 22, 1943.
20.—Falk. *Foundry Trade Journal*, Nov. 21, 1935.
21.—Donoho. *Iron Age*, April 1, 1943.
22.—Farr. THE FOUNDRY, September, 1939.
23.—Moldenke. *Foundry Trade Journal*, Sept. 25, 1924.
24.—Dreher. *Metal Progress*, December, 1940.
25.—Meckel. *Metallwirtschaft*, April 14, 1939.
26.—Cammen. American Society for Steel Treating, January, 1927.
27.—McConway. *Journal*, Iron and Steel Institute, Vol. 2, 1922.
28.—Carney. U. S. patent No. 1,277,543. Sept. 3, 1913.
29.—British patent No. 238,055. John Brown & Co. Ltd.
30.—Pardun. *Stahl und Eisen*, Vol. 45, p. 1178, 1925.
31.—THE FOUNDRY. July, 1939.
32. British patent No. 555,437. 1942. Ford Motor Co.
33.—*Iron Age*, May 13, 1943.
34.—*Metal Progress*, January, 1941.

WORKING WITH ALUMINUM?



Typical layout for die casting, showing compact 20 KW Ajax-Tama-Wyatt furnace in position. Unit comes with complete control cubicle, as shown.

INVESTIGATE THIS UNIQUE HOLDING FURNACE for IMPROVED OPERATIONS and LOWERED COSTS!

INDUCTION FURNACES MEAN A MODERN PLANT..

In addition to the holding furnace here described, small, compact, twin-coil melting furnaces are likewise available for continuous production.

Rolling mills and foundries using Ajax-Tama-Wyatt units have *consistently* developed the highest physical properties in their aluminum products . . . with decreased gas absorption, absence of all segregation, and elimination of oxide inclusions and hard spots . . .

Clean-cut temperature control, great ease and simplicity of handling are operating characteristics. Ajax induction furnaces give you a modern plant, a cooler foundry, a better product. Significantly, too, they have been known to pay for themselves within less than six months. *Write for latest TW catalogs describing both Ajax holding and melting furnaces for aluminum!*

ADVANTAGES

- Every element of uncertainty is removed from holding furnace procedure
- Automatic, positive temperature control to within 5 degrees
- No segregation, iron pickup, or contamination — automatic stirring
- Always ready to operate — no heating up or waiting periods
- Pays for itself quickly by doing away with pot or crucible replacements
- Maintenance costs so low as to be virtually negligible
- Low operating costs — only 12 KW for holding continuously up to 400 lb.; 8 KW when covered on week ends
- Greatly improved overall foundry conditions inherent in induction melting

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

AJAX ENGINEERING CORPORATION • BOX 1418 • TRENTON 7 • N. J.

AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Rudgren Electric Split Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

ASSOCIATE COMPANIES

HUMANICS IN THE FOUNDRY

(*Continued from page 89*)

favorable or not and no matter how he gets it.

There is always the timid soul—our old friend Milquetoast.

The pouter who is extremely sensitive and accordingly always picked upon and rarely gets what he deserves.

The tattle tale, sphinx, the chatterbox, the scatterbrain whose minds run around the neighborhood. The ants in the pantser, the creative genius who wants to redesign the apparatus before he knows what it's for. The leader, the maker, the arranger and thank God the normal, that is the standard production model which I am sure the great Chief Engineer thought he was designing when he made mankind.

The normal a composite of all Mr. & Mrs. John A. Public. The average individual who is in the majority and in the driver's seat as far as society is concerned.

I am sure we will all agree that we have never been in an organization which did not contain these types and I predict that we never shall. We shall always have them and in about the same proportion, so it just seems that we might just as well make up our minds that whatever we do has to be done through them just as they are. For experience seems to prove we are not going to get very far trying to change them. This suggests the mistake far too many bosses have made in dealing with their people on the basis that everyone of them could

do what they have done if they wanted to badly enough and tried hard enough. It would be just like brass blaming gray iron for getting all rusty, or for aluminum blaming lead for being so damned heavy.

Say! I think we've got something here. In some ways people are like materials. Some are like gray iron—stiff, take on a nice finish, but crack under too heavy a load. Some are like copper—hard to shape but stand up well under fire. Some are like aluminum—light weights, but give a darned good account of themselves in spite of it. Some are like glass—transparent as hell, hard, and will go all to pieces if you give them a jolt and you're liable to cut yourself if you don't handle them just so.

Now, if you gave me a pattern and asked me to make a mold, I'd have to know what we were going to pour into it to get a casting. Or, if I ground a drill for steel, I'd have one heck of a time with it in copper. I must know what material I am working with and the characteristics of that material. A satisfactory approach to the bully would paralyze the timid soul, and the wet nursing required by the pouter would be nauseating to the self-reliant leader.

Develop Man-to-Man Contacts

So we have to know what human metals we are dealing with and the natural characteristics of those metals. In any event, it becomes quite evident that no one standardized approach will serve the unavoidable hodgepodge of miscellaneous temperaments and types. Efforts to do so in the past are, no doubt, largely responsible for the employe relations difficulties we have had. By facing Fact No. 1, we are forced to the conclusion that a mutually satisfactory employe relations can only be the sum of the personal relations existing between each and every employe and their bosses. This means that such a relationship can only be developed through man-by-man and man-to-man contacts. If we want to preserve our industrial freedom these contacts will have to be scheduled and made.

Fact No. 2—People can't change as much as we would like to see them change. I have lots of fun in my little foundry experimenting with alloys. It's remarkable to me what a variety of metals copper will provide when seasoned with other materials. From dead soft brass to aluminum bronze. I saw a beryllium copper cold chisel hard enough to chip a gray iron casting. But there is one thing we can't do, we can't change iron into aluminum.

In emphasizing the powerful influence of heredity upon human behavior, I do not want to give the impression of futilism. People can change just as copper can change but by the same token, there are limits.

For instance, a youngster who has no ear for music can, through years of painful and tedious practice, learn to play after a fashion. On the other hand, a little Italian with music in the family blood for generations can with one-tenth of the practice of the untalented so far overshadow him as to make his efforts seem a waste of time.

I have noticed that the most effective foremen, superintendents and managers are those who spend much more time trying to determine the base metal of their employes and helping them develop along the lines of their natural inclinations than trying the alchemists trick of changing lead into gold.

So facing Fact No. 2, people can't change as much as we would like to have them change, forces us to the conclusion that we must not only know the type of human metal we have to deal with but also the best use to which it can be put and the limits of reasonable change to expect.

Fact No. 3—No one is the same all the time. If you were to bring me a piece of steel and say "Doc, drill a ⅝-hole 2½ inches over on this line from the edge." Even though I knew it was steel, in fact had the analysis, I would be foolish to try until I knew what treatment the steel had received. Was it hardened? And if so, was the temper drawn? How far? Or is it completely annealed?

Unless I know the treatment my human metals have received, I will bungle just as badly as I would in the case of drilling the steel. A slap on the

REJECTS BELOW 1/4 OF 1%!
A Highly Expert Foundryman reports to AJAX

Nonferrous founders have made astonishing records in the last 3 years. The following—for which this representative eastern foundry was thrice awarded the Army-Navy "E"—will appeal to all foundrymen because of its modesty, which is typical, though the achievement is extraordinary.

Send for booklet
"INGOT METALS OF TODAY"

16 STANDARD INGOT METALS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax-Hamilton Gear Bronze
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

"We have used 1,197,924 pounds of your metal, mostly aluminum bronze, manganese bronze, and manganese aluminum bronze. All of this has gone into Army and Navy material. It has been subjected to severe tests, both chemical and physical, in castings weighing from ½ to 750 lb. each. A lot of this had to stand a hydrostatic test of 7,700 lb. On this production, we feel it safe to say that our rejects have been less than ¼ of 1% due first, to your fine quality of metal, and second, to our good luck."

We are always gratified to receive letters of this character, and take pleasure in placing it among many similar ones received during our 65 years in the metal business.

AJAX NON-FERROUS INGOT METALS AND ALLOYS FOR FOUNDRIES
ESTABLISHED 1880
METAL COMPANY · PHILADELPHIA

AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

ASSOCIATE COMPANIES

back of the bully with "How's it going, you horses so and so?" could bring back a "What's it to you cockeyed son of a sea cook," in the best of spirits and understanding. But the same process on the bully the morning after one whole night spent watching beside the crib of the only kid as he teetered on the fence which divided the now from the great unknown would be criminally out of place, to say the least.

Yes, we have to recognize that human behavior is the product of the kind of a person and the shape he is in. A chronic bellyache does surprising things to the behavior of a pretty good egg. Off-the-job troubles with money, the wife, the kids, women, the law, drink or the mother-in-law sometimes are greater factors in the behavior of the individual than his inherited basic characteristics.

So facing Fact No. 3, no one is ever the same all the time, forces us to the conclusion that we have to get on such a basis with our people and keep close enough in touch with them that we will learn and know accurately whether the heat is on them, whether they have been quenched, drawn and how far.

Fact No. 4—Everyone is proud of being different. I feel pretty sure you are happy that there is enough recognizable difference between you and me, so that they don't take you for me. That certainly would be bad for you.

Yes, people are proud of being themselves as God made them. Do you know what I think?—That when the smoke finally clears away from the clashes between so-called management and labor, between so-called class and class, we will discover that the Ethiopian in the woodpile is not share the wealth, working condition, say-so in management but this—that craving in every human being, as strong as the urge to breathe and breed—to have the differences which separate and identify us as separate and distinct persons recognized and taken into consideration by those we work with and particularly by those we work for.

Employe relations is only another way of saying how employes feel toward management in relation to how management feels toward employes. This is a fact. Most of the things people do are done because they feel like doing them, not because they think they should. *Feeling* is the next great cost-reducing and production-increasing tool with pride at the heart of it.

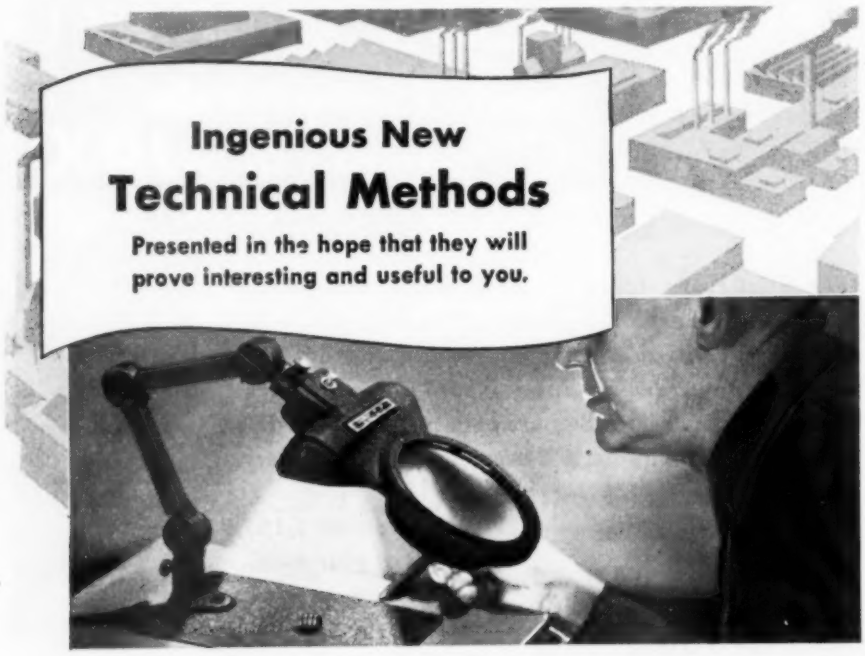
Sifts Out Human Feelings

For some silly reason, we have placed a screen at the doors of foundries which sifts out those human feelings which mean so much to us at home with neighbors and the gang. We seem to be ashamed at being caught with them inside. I am beginning to believe that most of our employe relations can be solved by taking down that screen and overcoming our childish fear of feeling toward each other the same as we do toward our neighbors and friends at home. The right sort of a feeling between employe and employer is to my way of thinking the most important factor in production and production costs.

I would like to close with this thought. If we would use the same kind of fact finding honesty, ingenuity and faith we employ so successfully in solving our mechanical problems, in our approach to the solution of our human behavior problems, we would have even greater results in terms of employe relations.

While, as we have said, people are all different and no one the same at any one time, making human behavior hard to account for and even harder to predict, the fact remains that no two grains of sand in a car are alike. Yet, we buy the car on the basis of a few tiny samples, for we find that in important respects the rest of the sand is the same as the samples—at least for all practical purposes.

I predict that we shall find human behavior just as predictable, just as measureable and just as understandable as the behavior of the physical laws which govern the materials and apparatus we use so successfully. The only thing is we have taken human beings and their behavior for granted in the past. We've got to turn over a new leaf and use our heads instead of our emotions in the great field of humanics. It will pay great dividends, and that's another fact.



Ingenious New
Technical Methods
Presented in the hope that they will prove interesting and useful to you.

New Fluorescent "Flud-Lite" Magnifiers Increase Efficiency of Inspectors, Assemblers, Toolmakers and Machinists!

For use in every war-busy plant, this newly devised "Flud-Lite" Magnifier, increases eye-efficiency—reduces error—takes strain off the worker. The device, available in two models: bench-type (illustrated), and portable-type (without base and friction joint arms), does two vital jobs:

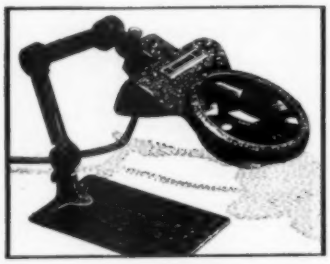
(1) Magnifies the work through a high-quality five-inch diameter lens. (For supermagnification, an attachment is available which doubles the power of the lens.)

(2) Floodlights the work with a built-in, glare-free, daylight fluorescent light.

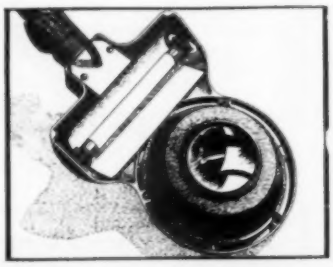
Frame and arms of "Flud-Lite" are die castings, ribbed for strength and efficiency. Durable black finish. Magnifier operates on AC current, 110-120 volts, 60 cycles. Precision built throughout, it's a help-on-the-job worth remembering.

Remember Wrigley's Spearmint Chewing Gum, too. Our guarantee of the product has always been uniform highest quality. That guarantee still holds, even though that familiar wrapper is now empty, because we have ceased manufacture of Wrigley's Spearmint Gum. And we will resume production only when we ***know*** we can make it up to Wrigley Spearmint standards.

You can get complete information from Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut

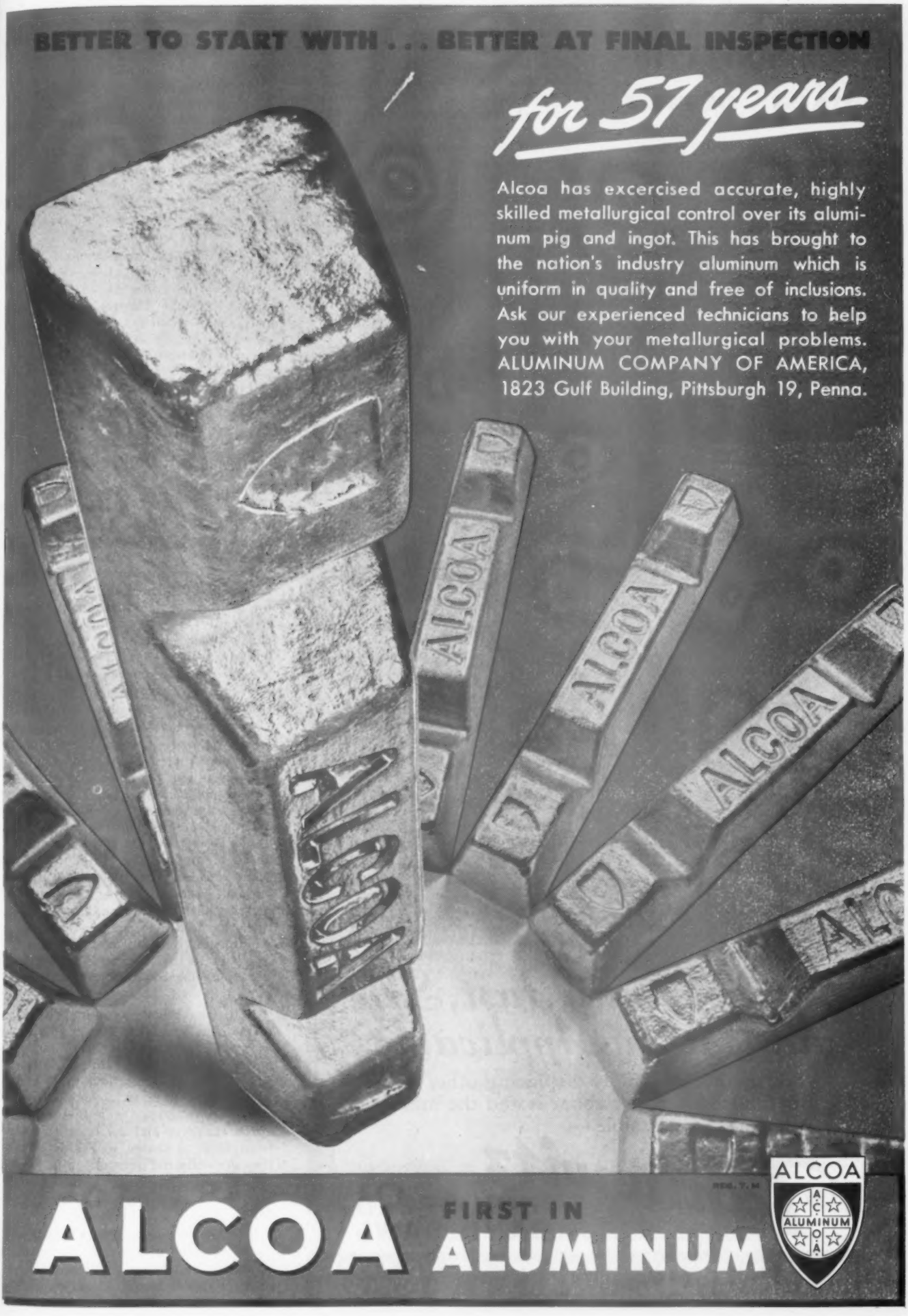


Bench type "Flud-Lite" Magnifier, with adjustable friction arm joints.



Bottom view, showing built-in fluorescent daylight lamp.

Z-63


BETTER TO START WITH . . . BETTER AT FINAL INSPECTION
for 57 years
Alcoa has excercised accurate, highly skilled metallurgical control over its aluminum pig and ingot. This has brought to the nation's industry aluminum which is uniform in quality and free of inclusions. Ask our experienced technicians to help you with your metallurgical problems. ALUMINUM COMPANY OF AMERICA, 1823 Gulf Building, Pittsburgh 19, Penna.
ALCOA
ALCOA
ALCOA
ALCOA
ALCOA
ALCOA
ALCOA
ALUMINUM
ALCOA FIRST IN ALUMINUM

PLANT MODERNIZATION RAISES OUTPUT

(*Continued from page* 105)

fits for ramming. These machines, designed and built by the company, incorporate an air-operated mechanism that draws the pattern by elevating the flask after it is rammed.

As the table revolves, the drag for each casting precedes the cope as the flasks pass under the sandslinger head. The sandslinger is located on the floor outside the table, and its operator, standing on a platform inside the revolving table, is required only to fill each flask as it automatically comes into position. The mold then moves on to other operators, each of whom is assigned a specific task in the subsequent steps of completing the mold. The rammed flask first is lifted to a sufficient height to clear the pattern by the air-actuated upward movement of four pins on which the flask rests. No bottom board is clamped to the drag when it is rolled over. Rolling over is accomplished with the assistance of a bail permanently attached to trunnions on each flask. A jib crane raises the drag, which then is rolled, swung over to the conveyor line and lowered to a steel plate resting on top of the conveyor trays. This plate serves as a bottom board for the mold when it is poured.

Another operator sets the cores, and by the time this is completed the cope has been picked up from the table and brought over to the conveyor by crane, and the mold is closed. Aluminum flasks of the pop-off type are used and are quickly removed from the closed mold by other operators and returned to their respective stations before the latter again revolve to the slinger.

This turntable arrangement permits adequate flexibility in choice of molds to be made. It is not necessary to make molds for eight different types of castings, since two or more patterns may be provided for the same casting in the event a relatively large number of one particular type is required. Replacement of one pattern by another at the stations can be accomplished quickly.

Ladle Moves With Mold

Pouring platform for the slinger conveyor line is located a short distance from the molding table and is immediately preceded by a station at which slip jackets and weights are placed on the molds. A 1000-pound bull ladle is picked up by one of several monorail hoists from the lift truck which delivers it from the furnace, and is moved along the platform at the same rate of travel as the conveyor by a moving overhead chain which engages the hoist. This permits the operator to give all of his attention to the pouring and makes it unnecessary for him to push the ladle in order to keep up with the moving molds.

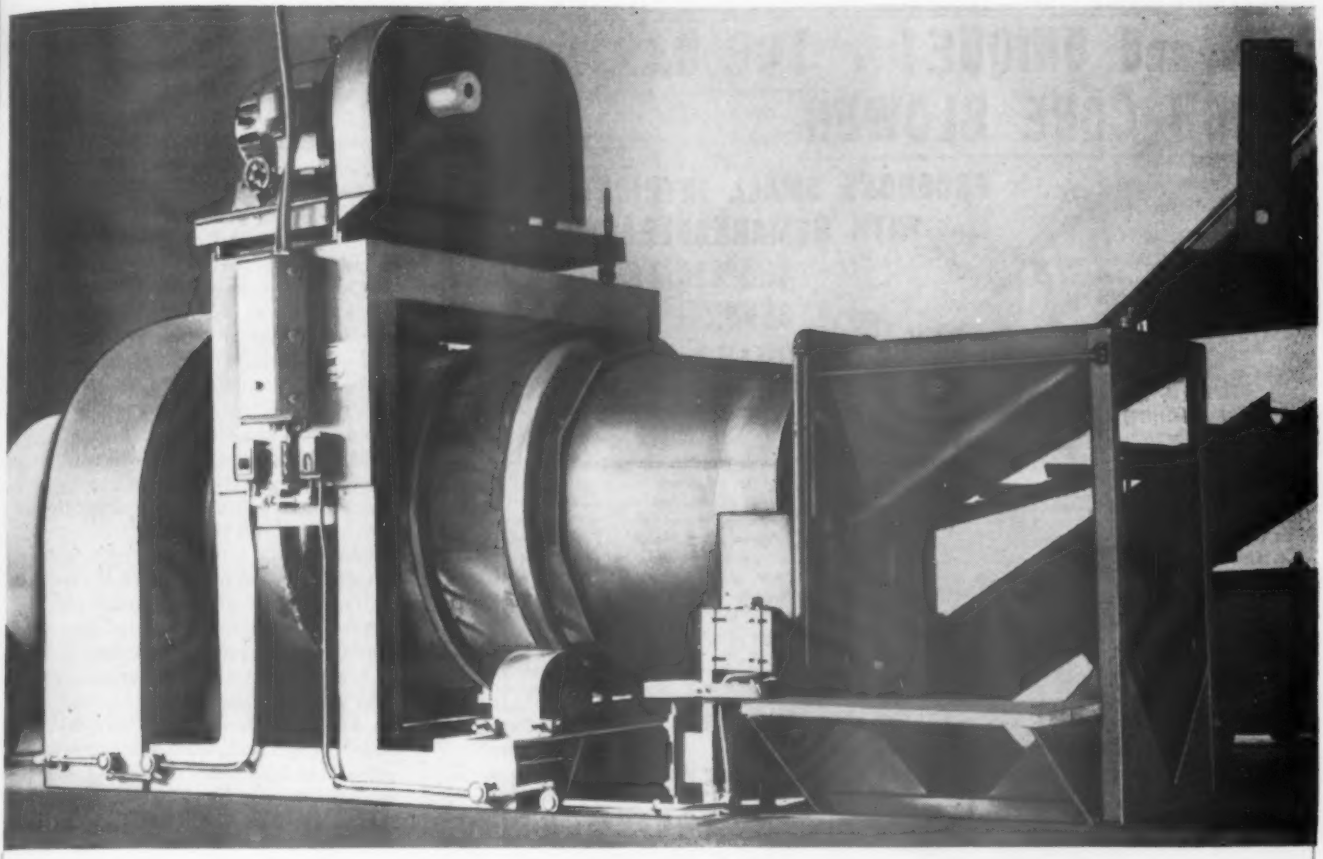
The conveyor line is partially hooded at the pouring platform, so that smoke and fumes largely are removed at their point of origin, as shown in Fig. 6. The line is completely hooded beyond the pouring station, and poured molds remain under cover until they return to the jacket and weight transfer point just ahead of the shakeout. About 1 to 1½ hours is the elapsed time between pouring and automatic dumping of the molds on the shakeout depending upon the speed of the conveyor. Fig. 7 shows the molds being dumped, and although this is a view of the hopper conveyor line, the arrangement is similar for the slinger line.

Both shakeouts, located below the main floor, have 5 x 8-foot grates and are well protected by hoods and exhaust equipment to prevent dust and smoke from drifting about the foundry. The castings, freed from sand, drop from the shakeout grate to a 30-inch wide apron conveyor and are returned to the main floor, as shown in Fig. 9. There they are collected in trucks to be hauled to the spruing building. Sprued castings later are trucked to the annealing room for treating.

The hopper conveyor line is loaded by bench molders stationed at 12 machines located in an adjoining and parallel row about 100 feet long. As shown in Fig.

(*Concluded on page* 232)

FRICTION SAWING
● SHEET STEEL Formed or Flat
● NON-FERROUS METALS Formed or Flat
● ARMOR PLATE
● SOFT or HARDENED STEELS
● PLASTICS
● GLASS and Other Materials
By Arthur A. Schwartz
Chief Tool Research Engineer
Bell Aircraft Corporation
WRITE FOR FREE COPY OF THIS VALUABLE BOOKLET
Sensationally Fast, Safe and Widely Applicable..
this method is rapidly displacing other cutting methods. Learn all about it and the machines that make it possible —
Tannewitz
HIGH SPEED BAND SAWS
THE TANNEWITZ WORKS
GRAND RAPIDS 4, MICHIGAN



Ransohoff

Automatic Handling of Stars .. Easy .. Gentle .. Economical .. Not Self-Destructive

WET CLEANING MILLS

Just Like Clock-work . . . This Mill Cleans 2000 lbs. Of Castings In 15 Minutes

GOOD and fast . . . good and clean . . . castings used in agricultural implements are cleaned thoroughly and quickly without mill wear in this Wet Cleaning Mill. Since many of these castings are assembled without further machining extreme cleanliness is imperative . . . and this mill actually does just that.

RANSOHOFF WET METHOD

Castings cascade in a mass in which stars of various sizes are so thoroughly intermingled that all voids are filled completely. Every casting is cleaned absolutely . . . . indentations remain sharp and clear . . . no nicking, breaking or mill wear. No dust-collecting systems required. Health hazards reduced to minimum. Mills are not self-destructive.

This shows an end-loading, end-unloading cleaning mill and the discharge end.

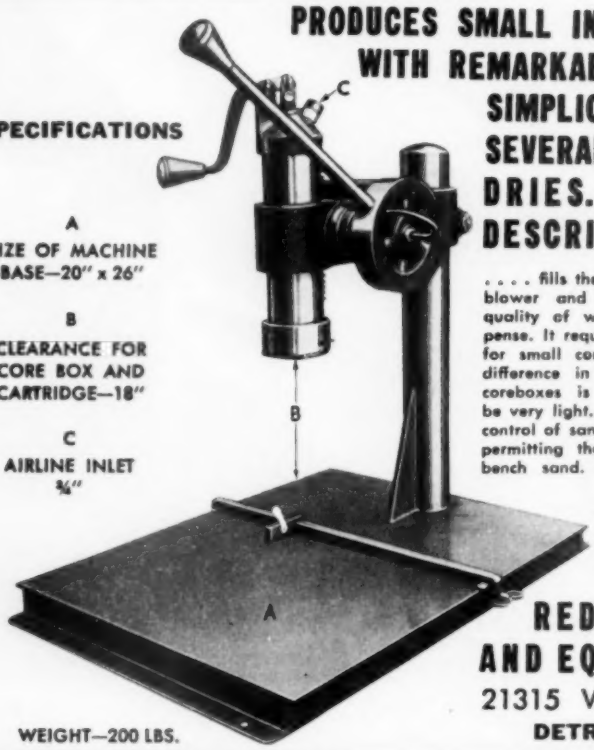
N. Ransohoff, Inc.

TOWNSHIP AVE. AND BIG 4 R. R. · CINCINNATI 16, OHI(

Send us a sample batch. RANSOHOFF FIELD ENGINEERS will be glad to give your cleaning problems careful consideration.

NEW and UNIQUE! » THE CARTRIDGE BENCH CORE BLOWER

PRODUCES SMALL INTRICATE CORES WITH REMARKABLE SPEED AND SIMPLICITY. IN USE IN SEVERAL LEADING FOUNDRIES. WRITE FOR DESCRIPTIVE FOLDER.



SPECIFICATIONS

A
SIZE OF MACHINE BASE—20" x 26"

B
CLEARANCE FOR CORE BOX AND CARTRIDGE—18"

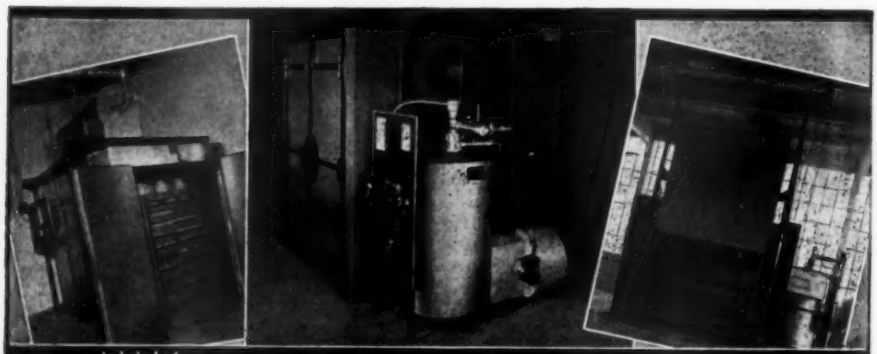
C
AIRLINE INLET ¾"

WEIGHT—200 LBS.

. . . . fills the need for a simple, flexible blower and has raised quantity and quality of work at a minimum of expense. It requires no large volume of air for small cores and no adjustment for difference in height, size or shape of coreboxes is necessary. Coreboxes can be very light. The need for strict moisture control of sand has been greatly reduced, permitting the use of almost any core bench sand. Thus by eliminating sand trouble the quality of intricate work that may be done with the machine is greater than by any other method of blowing.

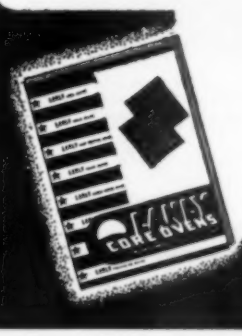
(Patents Pending)

REDFORD IRON AND EQUIPMENT CO.
21315 W. McNichols Rd.
DETROIT 19, MICH.



LANLY
CORE AND MOLD OVENS

If interested in new equipment or remodeling of ovens for core baking, mold drying or casting conditioning, write for this catalog.



It illustrates a complete line of equipment, describes the features responsible for highly efficient and economical operations and contains a list of Lanly oven purchasers whose known high standards are an implied endorsement of Lanly Ovens.

THE LANLY COMPANY
750 Prospect Ave. CLEVELAND, OHIO

(*Concluded from page 230*)

10, the proximity of the conveyors and height of its trays facilitate the molders' placing of completed molds on the line. Sand is obtained at each station from individual overhead hoppers. Molds are made in snap flasks and are equipped with jackets and weights before reaching their pouring platform. The conveyor travels at a speed of about 25 feet per minute and provides about 8 minutes cooling time between pouring and shakeout. As at its companion slinger line, molds are poured from 1000-pound ladles suspended from monorail hoists. Partial or complete hooding is employed over the conveyor between the pouring station and shakeout.

Throughout the modernized section of the foundry effectiveness of the dust control equipment at the usually troublesome points is evident. In all, approximately 80,000 cubic feet of air is exhausted per minute at the shakeouts, conveyors and sand preparation units.

The mechanical sand handling system involves two duplicate units, one for each of the two molding lines. A 24-inch underground conveyor belt takes sand from each shakeout, passes it over and through magnetic and screen separators and elevates it to another belt leading to storage bins. Two 3000-pound capacity mullers, located on the floor below the bins, have their controls on a single panel for operation by one man, as indicated in Fig. 8. These controls provide for automatic regulation of the mixing cycle. Prepared sand is taken from the mixers by elevators and belt conveyors, in the one case leading over the bench molding line where plows divert it to the individual hoppers serving the machine molders, and in the other case to the sandslinger hopper.

Cores are made in another section of the building and are trucked to the molding stations.

CHINA NEEDS RAW MATERIALS

(*Continued from page 101*)

iron, *fracture* test for steel and malleable, and for sand control, go back to the good old method of shaking sand in a bottle of water, and letting it settle. On the molding floor, one simply squeezes a handful of sand and sees how high it can be tossed without breaking when (and if) it lands in the hand.

Some of the plants have well equipped laboratories, but generally the Chinese foundryman does a fine job with whatever he can get. The Chinese are very appreciative of any help given them. They are particularly clever in short cuts. For instance, I wanted to get about 10 tons of very wet new sand dried out in a hurry. In a few minutes, they had spread the sand on a clean floor, and a gang of workers was laying rows of hot castings from the foundry on the sand, which dried very

(*Concluded on page 234*)

Below: Locomotive drive wheel casting after removal of riser pads by flame scarfing. Casting is now ready for machining; no grinding is required.

Photos Courtesy Pittsburgh Steel Foundry Co.

Saving 2½–3 HOURS OF GRINDING

Stubs or pads left on cast steel locomotive drive wheels after riser removal were formerly removed in this foundry by grinding. The operation involved the removal of approximately 60 pounds of metal from about 113 square inches of surface. It required 2½ to 3 hours per wheel and used up plenty of grinding wheels.

Today, these pads are being washed off with the oxyacetylene scarfing torch in approximately thirty minutes. No grinding is required; the castings are then ready for finish machining.

This is another example of the manner in which modern oxyacetylene and electric arc methods are helping wide-awake foundry operators cut production man-hours and costs. For details of others—machine cutting of risers, flame gouging, etc. — consult Airco's foundry booklet "Modern Oxyacetylene and Electric Arc Methods for Steel Foundries". If you do not have a copy, ask your nearest Airco office or write Air Reduction, General Offices: 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, General Offices: Houston 1, Texas.

AIR REDUCTION

OFFICES IN ALL PRINCIPAL CITIES

Originators of Modern Oxyacetylene and Electric Arc Methods for Steel Foundries

AIRCO

ALUMINUM

33 YEARS

Over this long period it has been our aim
—not to make the most—but to make the

BEST ALUMINUM INGOTS

THE CLEVELAND ELECTRO METALS CO.

CLEVELAND 13, OHIO

MEMBER — ALUMINUM RESEARCH INSTITUTE

Alnor PYROCON

the contact pyrometer for quick accurate surface temperatures

This convenient all-purpose surface temperature pyrometer is ideally suited to a variety of foundry and general industrial plant needs.

Accurate temperature readings are obtained in a few seconds, of liquids, oils, and flat or curved, stationary or moving surfaces. The rugged, shock-resisting Pyrocon movement is used with any one of eleven types of thermocouples, interchangeable without adjustment or re-calibration. Choice of rigid or flexible arms, or both, instantly interchangeable. Built in several ranges, 0-300 deg. F. to 0-2000 deg. F. Write for bulletin giving complete description.

ILLINOIS TESTING LABORATORIES, INC.

418 North La Salle Street · Chicago 10, Illinois

(*Concluded from page 232*)

promptly.

I have never before seen iron so carefully conserved; not a drop is spilled at the cupola or in pouring the molds. The men told me that this is because there is no way of getting iron shot out of the molding sand. Personally, I have another theory. Supposing you were working in your bare feet, or in straw slippers, would you be careful about slopping hot iron on the floor?

Many plants have good molding machines althouth greatly worn. In some shops the molder squats on the floor and produces beautiful molds entirely by hand. Where there are machines, they have well synchronized gangs of men, each with a specific duty. I watched sizable drags coming to the floor every 20 seconds from one machine.

The Chinese workers are most cheerful under rather trying conditions, and use extreme care in following out instructions. It is hard to imagine how they could operate without bamboo. Carrying baskets, shoes, roofs, walls, and even food, all use this useful material.

Most of the work is done by hand, but it is not as bad as it sounds. For example, I watched a gang of men shovel all the sand from a fair sized foundry into baskets, carry these by means of the invariable bamboo sticks to another room, sift the sand through bamboo sieves, wet it down, run it through two old Royers, and get it back in incredibly short time.

Fig. 2 of the accompanying illustrations is the molding foreman and assistants, with experimental steel munition castings, at one of the best foundries. Fig. 4 illustrates how the Chinese foundryman makes the best of his opportunities. No rolling mill was equipped for heavy steel rails for emergency use. So the foundry made the rails of cast iron, and they worked!

Fig. 3 is a shattered concrete column, on which is described the heavy bombing of that foundry.

Fig. 1 is my latest "passport" photo (One must furnish three photos every time he flies anywhere). I have not taken on weight, but have on one or two sets of wool underclothes and anything else warm. Temperature at this season (February) is about 40 degrees Fahr., and almost none of the houses or offices is heated. It is healthy when one gets used to it, but lots of clothes are needed.

Officers Elected by Fan Manufacturers

At the annual meeting of the Propeller Fan Manufacturers Association, held Feb. 21 at the Hotel Statler, St. Louis, H. M. Guilbert, B. F. Sturtevant Co., Boston, was elected president. Other officers include: Vice president, E. C. Englert, Hartzell Propeller Fan Co., Piqua, O.; secretary-treasurer, V. C. Shetler, 2-255 General Motors building, Detroit.

Now-3 LONG LYFE NOZZLES

to Meet all Service Requirements

AMERICAN-NORBIDE*

This nozzle has a Norbide* (boron-carbide) insert—the hardest material ever manufactured for commercial use. Only the diamond exceeds it in hardness. The insert is sheathed in a special abrasion-resisting jacket.

Guarantee: 1500 hours using steel abrasive; 750 hours using sand.

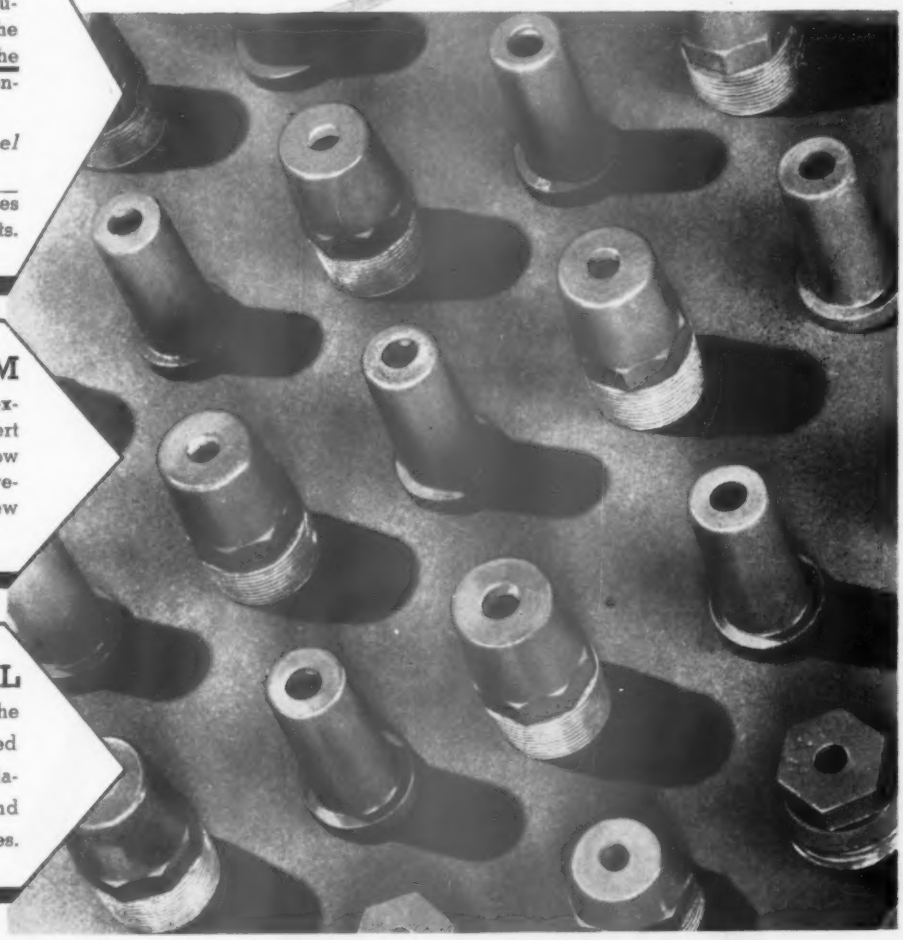
Supplied in flange and screw base types and in sizes to meet your requirements.

AMERICAN-HEANIUM

This medium-priced nozzle has an extremely hard and dense ceramic insert that provides long service life at low hourly cost. The jacket is of abrasive-resisting alloy. Made in flange and screw base types and in standard sizes.

AMERICAN V-METAL

This low-priced nozzle is cast from the same abrasion-resisting alloy metal used in various parts of the airless Wheelabrator blast unit. Made in flange and screw base types and in standard sizes.



*Registered trade mark for Norton Co's. boron-carbide.

SEE THESE SALES REPRESENTATIVES ABOUT YOUR NOZZLE PROBLEMS

BIRMINGHAM 3, ALABAMA—H. G. Mouat, 544 Martin Bldg. Phone: 3-3323

CHICAGO 26, ILLINOIS—E. A. Rich & Sons, 1737 Howard St. Phone: Briargate 4416-4417

CLEVELAND 6, OHIO—J. D. Alexander, Wade Park Manor, Corner E. 107th St. and Park Lane. Phone: Cedar 3300

DETROIT 2, MICHIGAN—A. H. Freeman, R. L. Orth, 7310 Woodward Ave., Boulevard Building. Phone: Madison 6800

LONGMEADOW 6, MASSACHUSETTS—C. L. Benham, 441 Longmeadow Street. Phone: Springfield 4-5461

LOS ANGELES 21, CALIFORNIA—Grant & Company, 2144 E. Seventh St. Phone: VA 1461

MISHAWAKA, INDIANA—V. S. Spears, 505 S. Byrkit St. Phone: 5-2144

NEWARK 4, NEW JERSEY—David Logan, 242 Broad St. Apts. Phone: Humboldt 21661

OAKLAND 8, CALIFORNIA—Pacific Graphite Works, 40th and Linden Streets. Phone: Piedmont 3300

PHILADELPHIA 31, PENNSYLVANIA—F. W. Pedrotty, 911 Wynnewood Road. Phone: Trinity 2062

PIQUA, OHIO—Russell Duer, 1612 Broadway. Phone: 534

PITTSBURGH 16, PENNSYLVANIA—Ferd. G. Schultz, G. H. Culley, K. R. H. Nelson, 215 Questend Ave., Mt. Lebanon. Phone: Lehigh 1928

PORTLAND 9, OREGON—Miller & Zehrung Chemical Co., 2201 N. 20th Avenue. Phone: Broadway 1171

ST. LOUIS 5, MISSOURI—Charles F. Ludwig, 807 Westwood Drive, Clayton. Phone: Parkview 9334

SEATTLE 4, WASHINGTON—Carl F. Miller Co., 1217 Sixth Ave., South. Phone: Main 4330

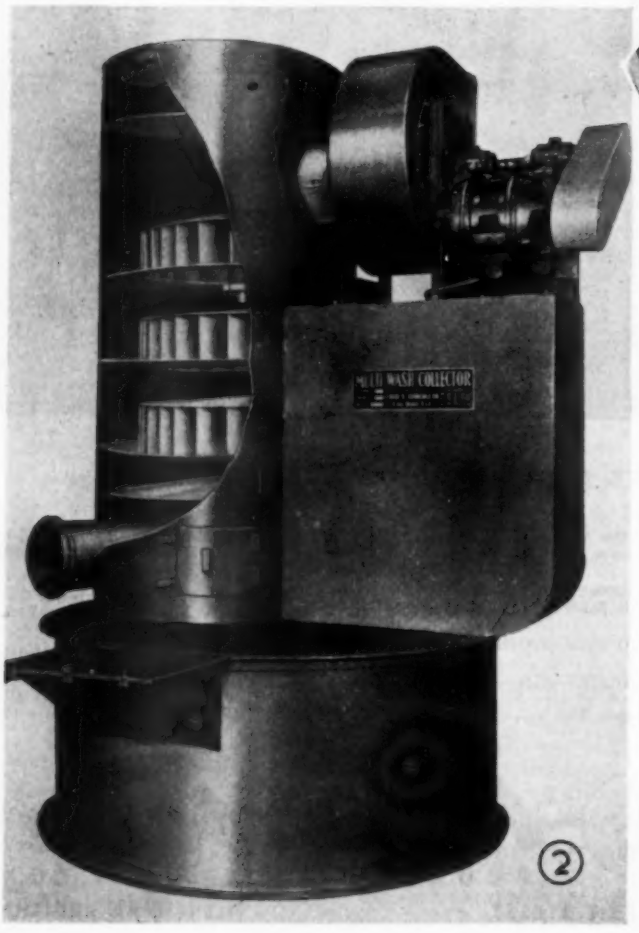
SPOKANE 8, WASHINGTON—Carl F. Miller & Co., South 121 Madison St. Phone: Main 1644

American
FOUNDRY EQUIPMENT CO.
505 SOUTH BYRKIT STREET MISHAWAKA INDIANA

NEW EQUIPMENT and SUPPLIES

(1)—Checking Set: Clark Instrument Inc., 10200 Ford road, Dearborn, Mich., is offering a master diamond set for checking the accuracy of instruments used in rockwell hardness testing. The set consists of a gold-plated diamond penetrator and two test blocks. When checking, the master diamond penetrator replaces the regular penetrator in the machine, and the two master test blocks are used only in connection with the master diamond. Since it is designed to be used only for checking purposes, the diamond penetrator retains its original accuracy for a long period of time.

(2)—Dust Collector: Claud B. Schneible Co., 2827 Twenty-fifth street, Detroit 16, has developed a portable self-contained wet method dust collector intended for use with isolated dust-creating operations which cannot conveniently be served by a central dust collecting system. Combining all of the functions of the central system, the equipment consists of a wash dust collector, suction fan, sludge settling tank, recirculating pump and after-filter. The unit is available in capacities of 400 to 5000 cubic feet of air per minute.

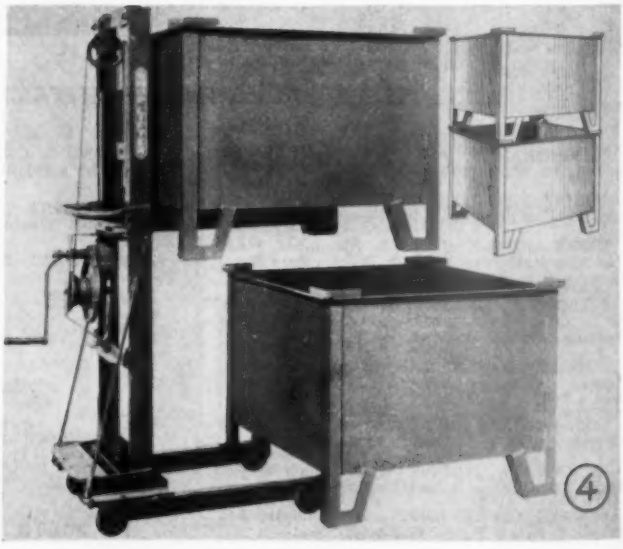


(3)—Pyrometer: Instrument Division, K. H. Huppert Co., 6830 Cottage Grove avenue, Chicago, announces a new pyrometer weighing 1¾ pounds and particularly adapted to reading temperature of molten metals (exclusive of ferrous metals) hot air or liquids and for hot surfaces, if used with the prod type thermocouple. The scale is set at an angle offering maximum reading ease and minimum side reflection on the glass. Duo scale is standard with degrees Fahrenheit readings of: 0-500 and 0-1000; 0-750 and 0-1500; or 0-1000 and 0-2000; or equivalent Centigrade readings. Other scales are available on request. Instrument movement provides accuracy of readings to 2 per cent of scale range.

(4)—Storage Bin: Palmer-Shile Co., 7136 West Jefferson avenue, Detroit 17, has designed a stacking type storage bin for use in handling small parts in course of production. Four-way entrance permits pickup from any one of four sides. The bin may be handled with hand or power lift truck or fork truck, and can be tiered with portable elevator, high lift or fork truck. It is made of heavy steel plate, with legs and corner reinforcements of angle iron.

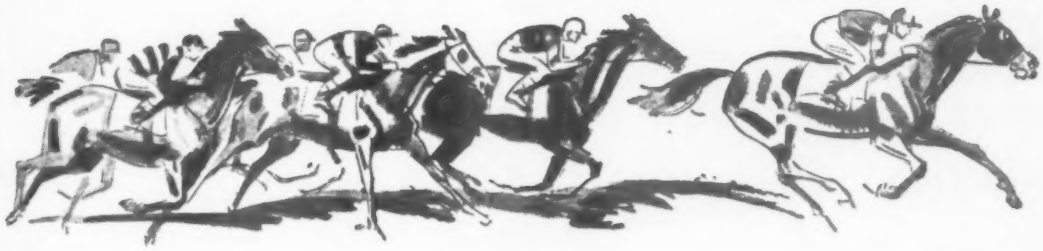
Riser Compound: Foundry Services Inc., 280 Madison avenue, New York 16, is marketing a range of riser feeding compounds for nonferrous metals and alloys to assist the production of sound, adequately fed, pressure-tight castings. The material in powder form is applied to the top of the riser in a

(*Continued on page 238*)



For a head start on the field...

Plan on GAS when Re-converting



The manufacturer who makes Gas a partner in his post-war planning will be far ahead of his competitors when it comes to turning out better products, doing it faster and at lower overall cost. Gas in the war industries proved itself the superior industrial fuel; showed, when time was precious and needs were great, that it can take on any heat treating job and do it better.

Gas is highly flexible and adaptable to any production schedule. It is a high speed, precision fuel, fully automatic in operation and its heat is accurately controllable. Desired temperatures are quickly obtained and can be maintained as long as desired. Gas is clean, convenient and improves working conditions.

BUY WAR BONDS—HELP SPEED VICTORY!

Your local Gas Company's Industrial Engineer is up-to-date on modern Gas equipment and industrial heating operations. He has much valuable material at his command and the research facilities of the Gas Industry in back of him. Phone or write him today to come to your plant and discuss Gas and what it can do for you.

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

Modern Design...
MEANS FUTURE ECONOMY!

The modernity of design and layout in your plant or plant expansion project will definitely be a determining factor in the success of your enterprise. The A. A. WICKLAND & Co. has devoted nearly a quarter-century to the solving of the many and varied problems associated with design, construction and operation of modern foundries. Our highly trained staff of engineers is always at your service and will be happy to assist you with any design or construction problems you may encounter. Write or telephone us today!

FOUNDRY ENGINEERS SINCE 1919

A. A. WICKLAND & CO.

ENGINEERING BUILDING • CHICAGO (6)

TELEPHONE DEARBORN 9344

TAMASTONE
A Short Cut to Increased Production

HUNTER FOUNDRY CO., CHICAGO REPORTS

500% INCREASE

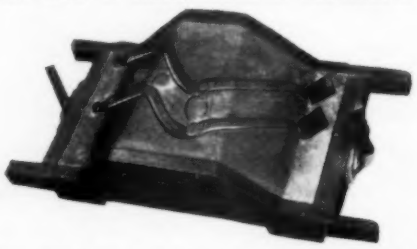
With original equipment, gated pattern and hard match only 10 to 12 molds per day were possible. Through the use of TAMASTONE Pattern Compound (100 lbs.) the job is converted to separate cope (A) and drag (B) patterns and production is now 60 molds per day. This new method enables the foundry to draw pattern from the sand as offset parting, eliminating the amount of sand to be lifted in the cope. Equipment is gated for pouring manganese.

Savings from 300 to 500% are possible in your plant! Write for literature!

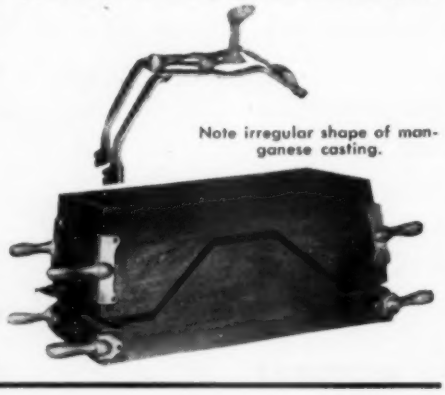
TAMMS SILICA CO.

228 N. La Salle St. • Chicago 1, Illinois

(A)—COPE is entirely made of TAMASTONE.



(B)—DRAG is of TAMASTONE with a metal gate.



Note irregular shape of manganese casting.

14" x 24" SLIP FLASK is designed to conform with extremely irregular parting line and manganese casting. Cope 11" high with 6" offset and 4" drag.

(*Continued from page* 236)

layer from ½ to 1 inch thick. Advantages claimed include automatic action, increase of metal temperature beneath covering, longer retention of metal in liquid state, permits reduction in height and volume of risers, etc. It is said that the material does not create obnoxious fumes, introduce an impurity into the metal or affect its composition.

Cover Glasses: Industrial Products Co., 2820 North Fourth street, Philadelphia 33, is marketing processed cover glasses for welders' shields. The glasses are 2 x 4⅛ inches and coated on both sides to guard against heat breakage and damage from metal spatter. The protective coating is baked on and claimed not to pit, peel or rub off. It is said that the treated glasses save many minutes per worker per day which would be required in replacing broken or pitted glasses.

Saw Lubricant: Kindt-Collins Co., 12651 Elmwood avenue, Cleveland, has developed a lubricant for band saw teeth, prepared in the form of a stick 6 inches long and 1 inch in diameter. It

is applied by pushing the stick against the saw teeth while the blade is in motion. When used on a metal cutting saw, it is said to make cutting easier and faster, and to prolong saw blade life, as well as preventing tooth breakage. On woodcutting saws the lubricant is said to prevent pitch from forming on the blade.

Indexing Fixture: Precision Scientific Co., 1750 N. Springfield avenue, Chicago 47, is manufacturing a new indexing fixture for Jominy hardenability bars, readily mounted on either the Clark or Wilson testing machine. The unit includes a rigid base casting, indexing screw and quick return mechanism. The plug which supports the fixture projects upward and forms the surface against which the diamond point presses the Jominy bar. A spring plunger

(*Continued on page* 240)

You get plenty of power from easily-held, smooth-running *CLECO GRINDERS*

FROM "snagging" in the cleaning room to light finishing on forgings, dies, etc., you will find the *right* model for *every* job in the extensive line of Cleco Rotary Grinders. These grinders feature rugged alloy steel rotors, heat treated and ground to exact size — insuring vibration free operation at all speeds. Governors efficiently control the speed, whether idling or under varying loads, providing ample power at all times plus utmost economy in air consumption. Highest grade ball bearings are used throughout. An efficient lubrication system helps increase the life of the tools. Bulletin 80 describes Cleco Grinders in detail and includes a large blueprint of construction details. *Ask for it!*

THE CLEVELAND PNEUMATIC TOOL COMPANY • 3781 East 77th St. • Cleveland 5, Ohio

Branch Offices in all Principal Cities

Heavy Duty Model 8455
Light Grinders, Models 214J and 9G
Vertical Grinder, Model 1460, with flexible pad and abrasive disc.
Help FINISH THE FIGHT!
Buy More War Bonds!
Light Grinder, Model 214

Consulting Service

with particular reference to

METAL MAKING

and

FOUNDRY OPERATING PROBLEMS

STEEL • MALLEABLE
GRAY IRON
NON-FERROUS

W. HARVEY PAYNE & CO.

PRACTICAL FOUNDRY ENGINEERS

4040 BOARD OF TRADE BLDG. — PHONE WABASH 3550
141 WEST JACKSON BLVD. • CHICAGO (4), ILL.

CONCO CRANES FOR FOUNDRIES

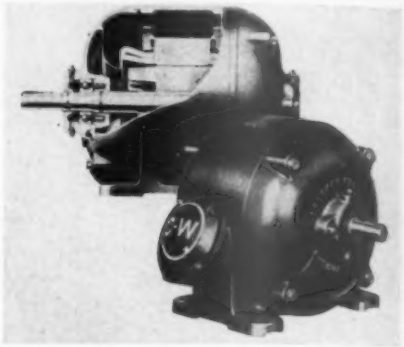
The ideal foundry crane—compact, strong, easily and quickly operated. Throughout the country foundries large and small—having important war contracts—are using this Conco Low-Headroom-High Hook Lift Crane. With many outstanding construction features, it is designed to meet the needs of today. Write us for complete information.

CONCO ENGINEERING WORKS
DIVISION OF H. D. CONKEY AND COMPANY
19 GROVE STREET — MENDOTA, ILLINOIS

(*Continued from page* 238)

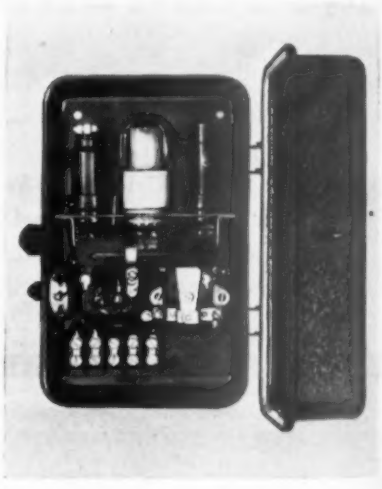
holds the test bar in position. The carriage screw is operated by a chrome plated hand wheel. An adjustable stop automatically sets the initial starting point on the test bar.

Electric Motor: Crocker-Wheeler Division of Joshua Hendy Iron Works, Ampere, N. J., has developed a new motor combining the surplus capacity of the conventional open motor with protection



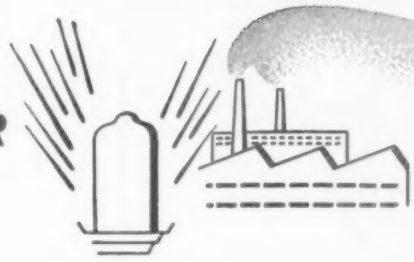
against dripping liquid, falling metal chips and other foreign matter. It is rated 40 C rise, full-load continuous duty, with a 15 per cent service factor. There are no openings in the frame or shields above the horizontal center line. This, together with the shielded construction of the ventilating openings, is said to make the motor suitable for machine tool and similar applications where other types of enclosures have been required in the past.

Pouring Control: Photoswitch Inc., 77 Broadway, Cambridge 42, Mass., is offering a photoelectric control capable of regulating pouring of metal in found-



ries, checking gas density and liquid turbidity, and providing level and interface control. In foundry use, with the help of "electric eyes," one operator, working from a remote station, now may control the pouring of several ladles simultaneously. When molds are in place the operator, through push-button control of the hydraulic actuating mechanism, tips the ladles. As metal reaches the riser of

(*Continued on page* 242)



LOOK FOR ...PREPARE FOR

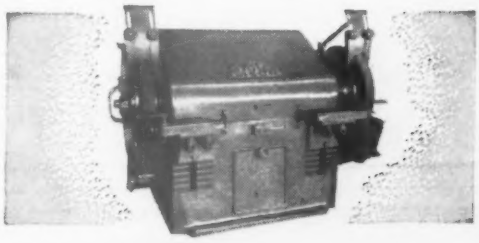
RUSH RECONVERSION

When the time for reconversion comes the pressure will be on the foundry and machine shop for fast and efficient action. Here's where SAFETY foundry equipment will help blast jams and bottlenecks—by keeping jobs moving with less time and labor, and at lower cost.

SAFETY EQUIPMENT FOR GRINDING KEEPS JOBS MOVING FAST!

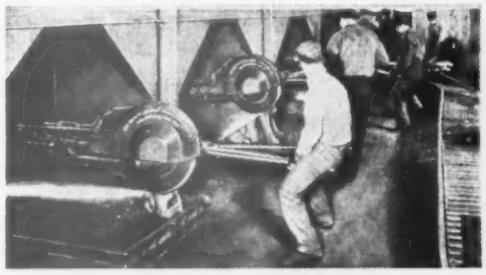
SAFETY "Rite-Speed" Grinders

Assure constant S.F.P.M.—the same at the end as at the start of the job. Constant speed! No over speeding! Reduces time and labor!



SAFETY Swing Frame Grinders

Unsurpassed for tough and heavy jobs. The grinding of welds and billets, the snagging of castings, and other similar operations, are handled with surprising speed and ease.

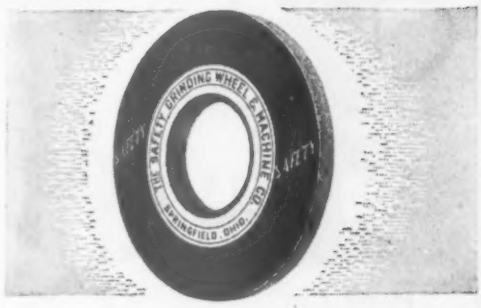


SAFETY Grinding Wheels . . .

Fast cutting, long life, low operating cost. The pinnacle of grinding performance.

Other *SAFETY* Products . . .

Yes, and there are other SAFETY products—invaluable NOW as well as for reconversion days ahead. Write for details!



SAFETY

GRINDING WHEEL AND MACHINE COMPANY

Main Office and Factory SPRINGFIELD, OHIO, Phone 4651

● Birmingham—3-3323 ★ Chicago—TRiangle 8308 ★ Cleveland—MAIN 6479-80 ★ Detroit—TOwnsend 3-4740
★ Pittsburgh—ATlantic 5218 ★ Erie—23-093 ★ Philadelphia—WAlnut 3132 ★ St. Louis—CEntral 3676
★ Syracuse—3-2131 ● St. Paul—Midway 4774 ● Milwaukee—Mitchell 0265 ★ Toledo—MAin 6637

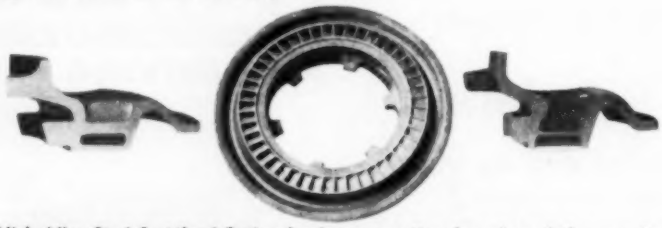
● *Sales Offices and* ★ *Sales Offices and Warehouses for Better Service!*

QUALITY • DEPENDABILITY
UNIFORMITY • PRODUCTION
...Vital in the Casting of Metals

FOUNDRY SPECIALISTS

A highly skilled staff of Foundrymen . . . Engineers . . . Metallurgists are ready to serve

SPECIALISTS IN:
- Methods for Improving Production and Decreasing Costs
- Metallurgical Control and Standardization
- Mechanization and Modernization
- Scientific Management Methods
- Manufacture of Centrifugal Castings

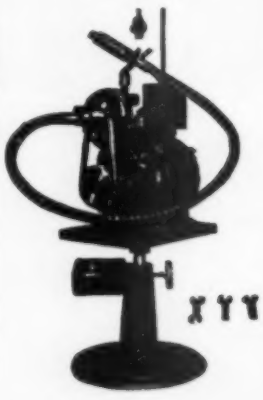


High Alloy Steel Centrifugal Casting showing cross sections formerly made from a series of forgings. Thin section 1/16-inch—100 per cent X-Ray Inspection.

W. G. REICHERT ENGINEERING CO.
1060 Broad Street —*Foundry Specialists*— Newark 2, N. J.

1905 Strand 1945
FLEXIBLE SHAFTS

SWIVEL BENCH TYPE MWH



FLEXIBLE SHAFTS AND MACHINES
ONE HUNDRED TWENTY-FIVE TYPES
LARGEST EXCLUSIVE BUILDERS

VERTICAL THREE SPEEDS

SEND FOR CATALOG No. 29

FLOOR TYPES SWIVEL YOKE MOUNTINGS

Hand Cut High Speed Steel Rotary Files and Ground Cutters

N. A. STRAND & COMPANY
5001-5009 No. Wolcott Ave. • Chicago 40, Ill.

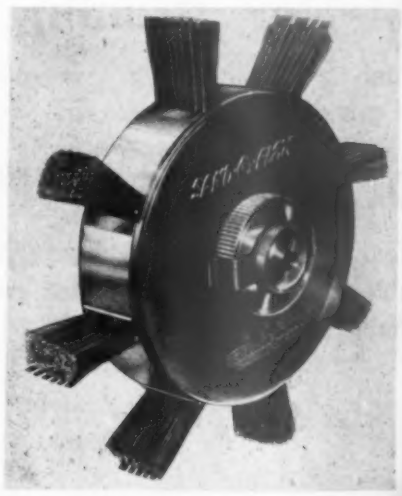
(*Continued from page* 240)

each mold, the light thrown off signals the watching "eye" that the mold is full; the control drops the ladle back and pouring automatically stops.

Casters: Market Forge Co., Everett 49, Mass., is producing a new line of matched casters for service where loads are up to 1 ton per caster. Instead of using a king pin in the swivel model, the large diameter ball bearing swivel serves as both a thrust and radial

bearing. All wearing parts are machined of high grade machinery steel, and the caster's design protects it from entry of foreign material. The rigid type caster is furnished with a heavy steel top plate and formed steel forks welded into a rigid single unit. The casters are available with all types of wheels and in diameters of 4, 5, 6, 7, 8 and 10 inches.

Sanding Wheel: Exactone Tool & Die Co., 4373 Melrose Ave., Hollywood 27, Calif., announces a new electrically driven, brush-backed sanding



wheel which sands, deburrs, finishes wood, metals, plastics, rubber products and many types of special materials. Shown in the accompanying illustration, the device consists of a central magazine which houses the strip abrasive. Eight of these strips extend through the housing and are held against the work by tough bristles

(*Concluded on page* 244)

TYPICAL

Cyclograph

100%

QUALITY TESTING

Non-destructive testing of machinability of metal stock to be machined in automatic high-speed equipment.

•

Inspecting iron castings for machinability.

•

Inspecting mixed lots of forged steel.

•

Inspecting 150,000 pounds of packaged welding electrodes according to analysis, without opening the packages.

•

Automatically sorting six and a half million copper-clad steel cups to discard those accidentally reversed in the stamp.

•

Sorting large quantities of mixed bolts according to their SAE analyses.

•

Checking gears for case depth.

•

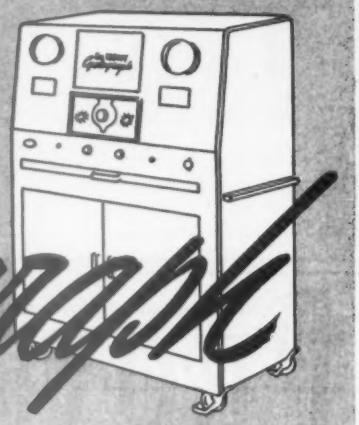
100% quality inspection and control of incoming materials and outgoing products according to metallurgical analyses, case depth, depth of decarburization, amount of cold working, brittleness (stress gradients), structure, etc., in either non-ferrous or ferrous metals.

100%

QUALITY INSPECTION

No chain is stronger than its weakest link. By the same token, no product is better than the quality of its component parts. Whether your parts are castings, forgings, or products machined from bar stock—bolts, screws or finished products—ferrous or non-ferrous, the Cyclograph may prove of invaluable assistance in speeding up or maintaining production. The

DuMONT *Cyclograph*



manned by semi-skilled workers, performs metallurgical tests that uphold high standards of quality according to predetermined values. And it performs these tests *non-destructively* and instantaneously!

Submit your problem . . .

- Our Materials Test Division is prepared to study your production quality control requirements. Available literature includes the Metal Testing Questionnaire which will assist you in compiling the data necessary for our study of *your* problem. Preliminary tests performed without obligation.

© ALLEN B. DU MONT LABORATORIES, INC.

DUMONT *Precision Electronics & Television*

ALLEN B. DUMONT LABORATORIES, INC., PASSAIC, NEW JERSEY • CABLE ADDRESS: WESPEXLIN, NEW YORK

Consulting Engineer

30 YEARS EXPERIENCE

in

GREY IRON FOUNDRIES

Metal Mixtures

Gates—Risers

Operating Economy

Blueprint Estimates

Pattern Construction

L. V. TUTTLE

CASWELL BLDG. • PHONE MARQUETTE 0622
152 W. WISCONSIN AVE. • MILWAUKEE 3, WIS.

PROVED

In 25 YEARS OF FOUNDRY SERVICE

Shelton Metallic Filler

A high grade cement for repairing surface defects in iron and steel castings otherwise perfect—the fastest drying, hardest setting cement available. Now offered to the trade in 1, 5, 10, 25, and 100 lb. containers.

Sample Free
On Request

PRODUCT OF

AMERICAN CRUCIBLE COMPANY

SHELTON, CONN.

(*Concluded from page 242*)

which cushion the abrasive, making it possible to get in and around corners. Overall diameter is approximately 8 inches; weight, loaded, is 2¾ pounds.

Combustion Tube: Harry W. Dietert Co., 9330 Roselawn avenue, Detroit 4, announces an improved combustion tube assembly for carbon and sulphur determination in metals and other combustible materials. Two

lengths of cylindrical refractory tube liners are inserted within the combustion tube before the latter is placed in the furnace. The boat containing the weighed sample is inserted within the liner at the center of the combustion tube. This center liner protects the tube from metal and slag splatter, and can be renewed when it becomes so full of splatter that it interferes with the boat passage. It is said to be more economical and time saving than the use of boat covers.

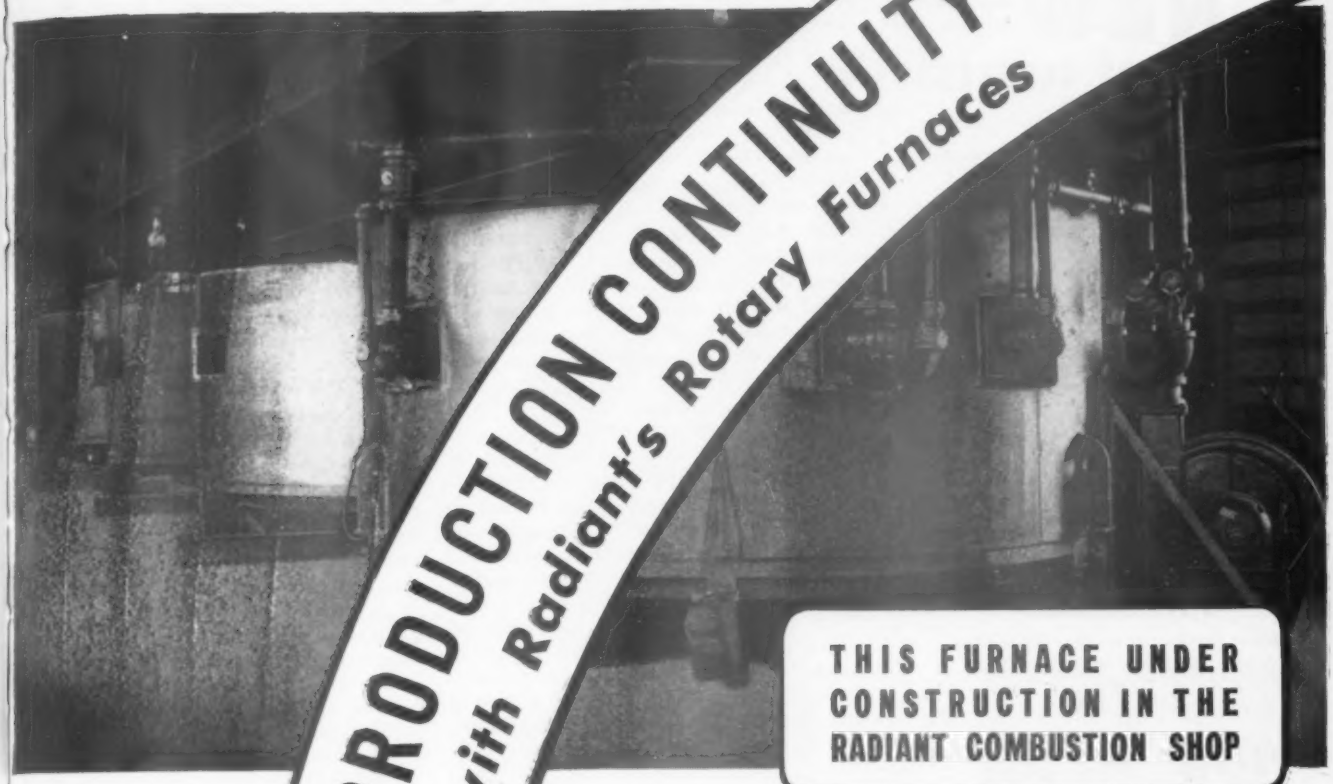
Self-Priming Pump: Construction Machinery Co., Waterloo, Iowa, is offering a new 6-inch centrifugal pump rated 90,000 gallons per hour with additional reserve capacity. Improved effi-

ciency is accomplished by mixed flow impeller and properly proportioned and shaped volute, triple self-adjusting shaft seal, built-in suction check valve, oversize ball bearings and heavy duty engine. The pump is also available with 1800 to 1200 rpm electric motors or diesel engine, and is suitable for construction work, oil field service and industrial applications.

Fireproofing Service: Universal Safety Equipment Co., 700 South California avenue, Chicago 12, announces a launder and fireproofing service for workers' clothing. All types of garments, shirts, sweatshirts, pants, coats, etc. are laundered and fireproofed and returned to the workers ready for wear.

LOWER UPKEEP COSTS

PRODUCTION CONTINUITY with Radiant's Rotary Furnaces



THIS FURNACE UNDER CONSTRUCTION IN THE RADIANT COMBUSTION SHOP

1. Floating gear with fully enclosed drive.

2. Three point bearing suspension regardless of the number of rollers used, insures equal loading of all rollers and eliminates rocking of the hearth.

3. Specially constructed, interlocked hearth that will not "grow."

4. Designed to be able to raise shell 8″ to 10″ to clear hearth when jammed.

5. Internally air cooled charging hearth, adjustable from the outside.

6. A new type water cooled door allows a continuous flow of water . . . all flexible connections and swing joints eliminated (patent applied for).

Write today for worth-your-while literature

Prompt attention to inquiries . . . On time furnace deliveries

Radiant Combustion, Inc

BUILDERS OF EVERY TYPE (OIL, GAS, ELECTRIC) OF HEAT TREATING FURNACE

WARREN, OHIO

IMMEDIATE DELIVERY
on the
NEW
"RAPID" HAND SQUEEZER
$122.00

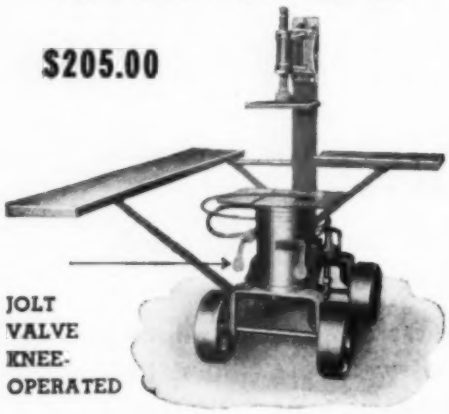
Will handle a lot of your bench jobs and save you money by trebling your production.

Handles flasks up to 16 x 30 inches. Comes complete with benches. Portable or Stationary Type.

★

"RAPID" R9X JOLT
30% increased jolt capacity

$205.00



JOLT VALVE KNEE-OPERATED

A Foundry producer of good molds for over 20 years.

Simple to operate.

Squeeze Plate quickly adjusted. Low initial cost.

★

Write for NEW descriptive folders and Price Lists.

PIONEER
MANUFACTURING CO.
Molding Machine Manufacturer for Over 20 Years
MILWAUKEE (West Allis) WISC

WASHINGTON *Notes* ★★★

PLANS for lifting wartime controls after V-E Day show considerable more caution than was evident some months ago, when fairly definite percentage cutbacks in war production were ready to be put into effect, awaiting only an early German collapse—a collapse that has been longer in materializing than was expected. WPB has made it plain that procurement for the major military effort against Japan will be enormous, that the reconversion program must be extremely flexible to meet military needs, and that the relaxation of controls will be gradual.

★ ★ ★

The task of working out details of problems involved in modifying and relaxing war and war-supporting production controls on industry after V-E Day will be in the hands of a new WPB committee to be known as the "Committee on Period One" (CPO). Consisting of 16 top WPB officials representing all phases of the agency's operations, the group is headed by J. D. Small, executive officer of WPB, and is divided into 11 principal sub-committees, each charged with certain phases of the overall problem.

★ ★ ★

REGULATIONS covering the pricing of steel castings have been changed in several respects by OPA, effective April 14. These revisions do the following: 1. Liberalize application of ceiling prices provided for castings for Navy or Ordnance use; 2. Provide for specific and uniform record-keeping of casting sales; 3. Eliminate the "production run" provision in quantity differentials so that foundries need not await completion of a run to determine the quantity differential to invoice a particular sale; 4. Clarify provisions for transportation charges or allowances on castings sold on a delivered basis; 5. Permit producers of centrifugal castings to submit cost data to OPA with a request for a special ceiling price for the casting.

★ ★ ★

Ceiling prices on certain railway steel castings have been increased by OPA, previous levels having been found "too low to be generally fair and equitable." Increases are 3 per cent on rigid and swivel yokes and 8 per cent on sideframes.

★ ★ ★

Adverse influence of the shortage in malleable iron castings on production of farm equipment has caused WPB to uprate a limited volume of malleable used by the industry to AA-1. Farm implement production (exclusive of repair parts) recently was 20 per cent behind schedule.

★ ★ ★

Cost to the government of acquiring stockpiles of critical materials between the middle of 1940 and the fall of 1944 was slightly less than 1.5 per cent of the more than $2 billion spent by the Metals Reserve Co., the RFC subsidiary formed to deal in strategic materials. About one-half the cost represents subsidy payments under the domestic copper, lead and zinc premium payment plan, the balance covering sales of metals and minerals, bought at above OPA ceiling prices, to war plants at or under these ceilings.

★ ★ ★

AMERICAN and British designers are getting together in an attempt to make it possible for shop machinists in both countries to understand each other's drawings and conventionel designs. It was found that many British blueprints omitted details American engineers expected to find, the reason being that in England great reliance is placed on the craftsmanship of old employes; also, a great deal of hand fitting is done. American mass production, however, requires all dimensions and tolerances to be clearly stated. This situation was a contributory cause to the 10-month gap between receipt of drawings for the Rolls-Royce Merlin engine and start of production here.

★ ★ ★

No drastic change is anticipated in war requirements for gray iron castings, it was indicated at a recent meeting of the industry's WPB advisory committee. However, military claimant agencies have been asked to scrutinize their programs to see whether further cuts can be made so that additional material can be released to war-supporting programs.

★ ★ ★

ALTHOUGH gray iron foundry production improved during January and February, especially in engine and other automotive castings, the industry has maintained to Washington officials that OPA price limitations are restricting operations. It declares that the extremely close margin to which the industry has been held is limiting its ability to improve production facilities and methods, quality of castings, and working conditions. This last feature also is said to be particularly harmful in attempts to attract new workers.

★ ★ ★

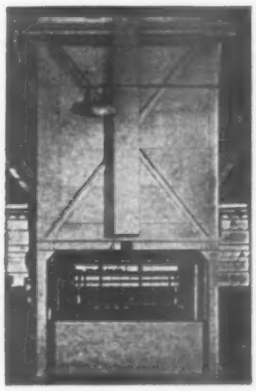
Expanded production schedules and continuing withdrawal of workers for the armed forces are reflected in the inclusion of nine new areas in the War Manpower Commission's latest tabulation of Group 1 districts—areas in which acute labor shortages exist or are anticipated. Among the additions are Toledo, Youngstown, DeKalb and Peoria, Ill., Indianapolis and Anderson, Ind., Grand Rapids and Jackson, Mich., and Perth Amboy, N. J. —W.G.G.

Carl-Mayer CORE AND MOLD OVENS

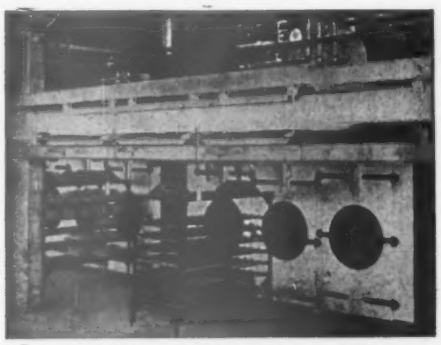
ALL TYPES . . . ALL SIZES

SERVING INDUSTRY OVER A QUARTER CENTURY

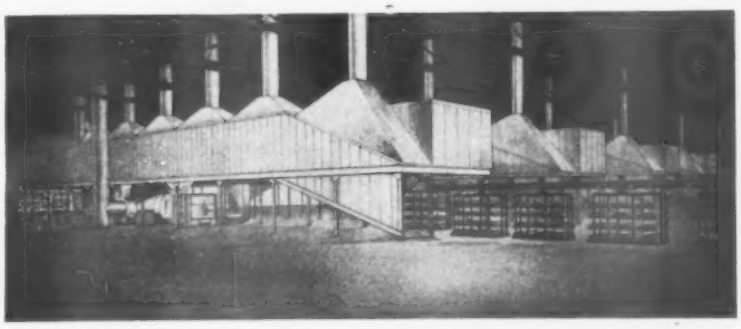
Three Outstanding Carl Mayer Vertical Ovens at General Steel Castings Corp. Each oven 67' high, 80 tons per bake, per oven.



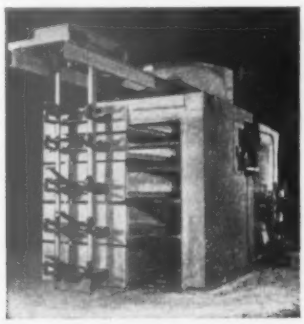
Typical Carl Mayer Vertical Core Oven as installed at outstanding foundries.



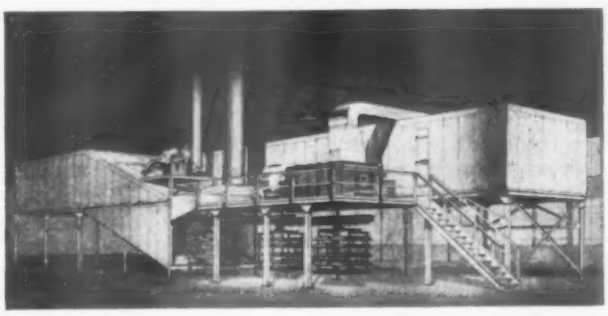
Part of large Carl Mayer Recirculating Gas Fired Rack Type Oven installation at The General Electric Co.



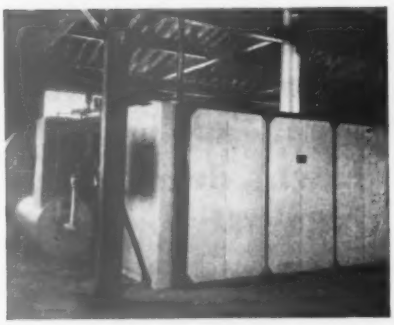
Four of the largest Continuous Monorail Core Ovens in U.S.A. for Ford Motor Co. each 170' long.



Rolling Drawer Oven Recirculating type. Fired with any fuel.



Third Continuous Monorail Core Oven for Eclipse Aviation, Bendix Aviation Corp. 27' wide, 78' long, load capacity of 10½ tons per bake.



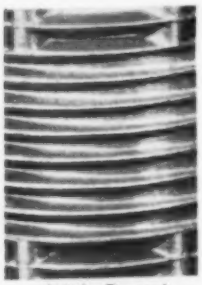
Car Type Mold or Core Oven with lift door as installed at Ford Motor, General Steel Castings, U. S. Steel Corp.

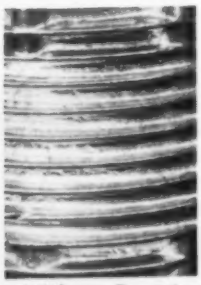
THE CARL MAYER CORPORATION • **3030 Euclid Ave., Cleveland, Ohio**

SERVING CONCERNS LIKE *these:*

Aluminum Co. of America
American Magnesium Corp.
American Radiator & Standard Sanitary Corp.
Babcock & Wilcox Co.
Bridgeport Brass Co.
Bucyrus-Erie Co.
Brown Industries Corp.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fort Pitt Steel Casting Co.
Frank Foundries Corp.
Fremont Foundry Co.
G & C Foundry Co.
General Motors Corp.
General Electric Co.
Gilbert & Barker Mfg. Co.
Henry J. Kaiser, Inc.
Packard Motor Co.
Shenango Penn Mold Co.
Studebaker Corp.
United States Steel Corp.
Whiten Machine Works
Whiting Corp.

FOSECO
DYCOATS
FOR BETTER
permanent
MOLD CASTINGS


With Dycoat


Without Dycoat

Highly efficient range for use in Aluminum, Magnesium, Zinc, Brasses and Aluminum Bronze where good finish, easy withdrawal, durability, progressive solidification and maximum output are required.

Write for samples, make your own test.

FOUNDRY SERVICES, INC.
280 Madison Avenue
New York, N. Y.

INJURIES AND ACCIDENT CAUSES

(*Continued from page* 106)

ing from the failure of chainmen to keep their hands off suspended loads and away from chains which were being placed under tension. The predominant types of injuries in this occupation were cuts, bruises, and fractures to the hands, fingers, feet and toes.

Greater use of safety shoes by chainmen undoubtedly would have prevented many foot and toe injuries, but the most essential measures for the prevention of injuries to these workers are: Better training in the proper rigging of crane loads, arrangements for better teamwork between the chainmen and the crane operators, and strict supervision to see that safe procedures are followed.

Chippers.—Flying chips caused more injuries to workers in this occupation than any other single agency, but a considerable number of chippers experienced hand, foot, and trunk injuries in the course of lifting or moving the castings on which they were working.

Practically all injuries caused by flying chips were eye injuries, which would not have happened if the workers had been wearing proper impact goggles. The absolute necessity for the use of goggles in all chipping operations is generally recognized. Nevertheless, some injuries were reported which resulted directly from chipping operations being carried on without the use of goggles. It is important to note that many chippers experienced eye injuries which were caused by chips coming from fellow-workers' hammers rather than from their own. Most of these cases occurred when the injured worker had stopped chipping and had removed his goggles.

On the basis of the record the most effective accident prevention measures in this occupation would be: (1) Make it a hard and fast rule that all chippers must wear proper impact goggles, not only while performing chipping operations themselves but also whenever others are chipping in the same room; (2) provide and use screens or booths to segregate individual chipping operations so as to prevent chips from striking other workers; and (3) train chippers in the proper methods of lifting or moving heavy castings, and see that proper lifting equipment or sufficient help is available when weights which are too heavy for one man must be moved.

Coremakers.—Although coremaking is comparatively light work, back strains were reported in this occupation more frequently than any other type of injury. In addition, a considerable number of coremakers were disabled by cut or bruised hands and feet. Adequate instruction in proper lifting methods and an increased use of safety shoes undoubtedly would substantially reduce the number of injuries to coremakers.

Grinders.—Eye injuries produced by foreign particles were more common than any other type of injury in this occupation, and working without goggles usually caused such injuries. There were also a number of reports of eye injuries which stated that the workers had been wearing goggles and that the goggles were properly fitted and equipped with cups or side shields. As a possible explanation of this seemingly impossible occurrence, one safety engineer suggested that, in the course of grinding, many metal particles may adhere to the worker's forehead or eyebrow. When he removes his goggles and wipes his face some of these particles may be brushed into his eye. These particles could easily go unnoticed at the time, and later develop a noticeable irritation. Irritation might become apparent during later grinding operations when goggles are being worn and the case would be reported as a foreign particle entering the eye despite the use of proper goggles.

The reason generally given for failure of grinders to wear goggles was that they are uncomfortable. Consequently, the importance of arranging to have all goggles properly fitted to the individual wearers cannot be overemphasized. In this connection it is pertinent to note that in several of the foundries visited the Bureau of Labor Statistics representative was told that in normal times those plants had imposed penalties for failure to wear goggles when grinding. At the time of the survey, however, most of these penalty rules were being ignored because of the fear that enforcement would result in the resignation of much needed workers.

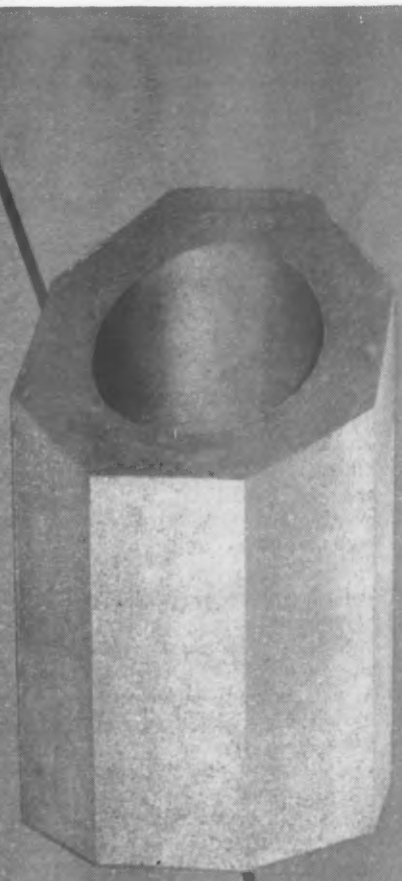
Finger and foot injuries also were comparatively common among grinders. Finger injuries frequently occurred because of lack of proper care in holding castings against the grinding wheel, causing the casting to "catch" and pull the operator's hands against the wheel. Dropped castings produced most of the foot and toe injuries.

Laborers and shakeout men.—In many foundries shakeout men were classed as laborers and were so reported. For this reason the injuries reported under both these occupational designations were considered together. Foundry laborers perform many unskilled tasks such as the moving of materials and the cleaning of workplaces, to facilitate the work of more skilled workers. Shakeout work is only one of the many tasks which may be given to a laborer.

Nearly a third of the injuries in these occupations were foot and toe cases, 23 per cent were injuries to the back or other parts of the trunk, and 21 per cent were hand and finger injuries. A fairly high proportion of the injuries, particularly among those affecting arms, hands, and feet, were burns. The majority, however, were cuts, sprains, bruises, and fractures. Most of these injuries resulted directly from improper methods of handling, lifting, or moving heavy materials.

(*Continued on page* 250)

Longer-Lasting BURNER BLOCKS



In high temperature gas or oil fired furnaces when combustion takes place wholly or partially in the tunnel of the block, ordinary fire clays and burner blocks will not stand up under the intense heat. They soon fuse and break down. For such furnaces Norton Company supplies burner blocks and burner tunnel cement made from a special mixture which is highly refractory, chemically stable and will not oxidize. For further information write to Refractories Division:

NORTON COMPANY • WORCESTER 6, MASS.

Norton Longer Lasting Refractories

MANAGEMENT COUNSEL

William H. Grundeman
Metallurgical Engineer

Counsel on metallurgical problems. Registered, licensed, professional engineer, B. S. degree, Metallurgical Engineering, Michigan College of Mining and Technology. Formerly metallurgist with large steel corporation; engaged in metallurgical research with geological department of U. S. Government and Michigan School of Mining and Technology; was field metallurgist and materials engineer with Army Ordnance Department and Navy Division.

■

Mr. Grundeman is a member of our staff of licensed, professional Engineers and Architects, all of whom are qualified to work closely with members of your company in helping to build a more effective business organization.

■

- Industrial Engineering
- Methods
- Work Standards and Costs
- Job Evaluation
- Wage Incentives
- Architecture
- Structural Engineering
- Civil Engineering

ASSOCIATED ENGINEERS INC.

Ft. Wayne 2 AEI Indiana

(*Continued from page* 248)

In view of the very large volume of foot and toe injuries, there can be little doubt that more general use of safety shoes and foot guards by laborers and shakeout men would do much to reduce the number of disabling injuries in these occupations. Better training in the safe ways of lifting and moving heavy materials, the providing of more mechanical equipment for handling heavy objects, and close supervision to insure that safe procedures are followed would probably eliminate most of the back and trunk injuries and also many of the hand and finger injuries.

Ladlemen or pourers. — Burns predominated among the injuries experienced by ladlemen. In most cases the burns resulted from molten metal being splashed or spilled from the ladles, and generally the burns were on the legs and feet. Moisture in the ladles and lack of proper care in taking hot metal from the furnaces were frequently given as the causes of these accidents. Careful training, strict supervision and use of protective clothing probably would have avoided many of the injuries experienced by ladlemen.

Machinists.—Many castings require considerable processing beyond the cleaning and rough finishing stage. Some foundries perform this additional function and for this purpose maintain a machine shop. Hand and finger injuries, eye injuries, and foot and toe injuries were most common in this occupational classification. Eye injuries resulted primarily from chips or metal particles thrown off by machines. Finger injuries were generally the result of contact with moving parts at the point of operation, while foot and toe injuries generally were caused by dropped materials. Greater attention to machine guarding, use of impact goggles when using machines which may throw out chips or particles, and use of safety shoes would have prevented a large proportion of the injuries experienced by machinists.

Molders and helpers.—Molding may be performed entirely by hand or may be performed in part with the assistance of various types of molding machines. Because of the heavy work frequently required, back strains and injuries to other parts of the trunk were particularly prominent among the injuries experienced by molders and their helpers. In proportion to the total number of injuries the number of hernias reported for molders was double that of any other occupation.

Foot injuries and hand or finger injuries also were numerous. Many molders and their helpers are required to pour their own molten metal and as a result a high percentage of foot injuries were burns. Slips in placing the cope upon the drag produced many of the finger injuries.

Molders generally have served long apprenticeships so that the excuse of inexperience and unfamiliarity with the hazards of the work cannot explain the failure to follow safe procedures or to use proper safety equipment, which was apparent in the descriptions of many of the molders' accidents. General safety instruction to stimulate interest in safe methods and strict supervision to stop slipshod procedures appear to be needed to reduce the accident record of this occupation.

Sandblasters.—Small and medium size castings may be sandblasted in enclosed machines, but large castings must be cleaned by directing the blast against the surface by means of a hand-held nozzle. Finger injuries predominated in this occupation. Most of these occurred through the workers getting their fingers caught in the sandblasting equipment.

Accident agencies.—The following references to an "agency" mean the object, substance, or exposure which is most closely associated with the injury and which could have been properly guarded or corrected. In the gray iron foundries visited during the survey the outstanding injury producing agencies and the proportion of the total volume of injuries with which they were associated, were: Castings, 10.3 per cent; molds, 9.4 per cent; flasks, coreplates, etc., 7.4 per cent; hand ladles, 7.3 per cent; and vehicles, 7.2 per cent.

In the malleable iron foundries considerably more injuries were associated with machines and proportionately fewer associated with flasks and coreplates than in the gray iron plants. Otherwise the agencies presenting the most common hazards were much the same in the two groups. For the malleable iron group the outstanding injury producing agencies and the proportion of all injuries in which each was involved were: Molds, 11.4 per cent; castings, 9.0 per cent; hand ladles, 8.7 per cent; machines (other than grinders), 7.2 per cent; and vehicles, 6.9 per cent.

In the steel foundries the five most prominent injury producing agencies formed a group very different from those of the gray iron and malleable iron plants. In the steel foundries castings were involved in 16 per cent of all the disabling injuries, a much higher proportion than in either of the other types of plants. Hoisting apparatus was associated with rather low percentages of the injuries in gray iron and malleable iron foundries, but in the steel foundries this equipment was involved in 11.9 per cent of all the injuries. Defective working surfaces, associated with 6.6 per cent of the injuries, was the third most important injury producing agency in the steel foundries, followed by machines (5.8 per cent) and vehicles (5.4 per cent).

"Struck-by" accidents.—Accidents in which workers were struck by moving, falling, or flying objects produced nearly half of all the disabling injuries in the malleable iron foundries and over half of the disabilities in gray iron and steel foundries.

Much of the work in foundries involves handling heavy materials. The castings, flasks, coreplates, molds, and

(*Continued on page* 252)

Whip difficult production schedules!

Use LINDBERG CYCLONE FURNACES

The famed Lindberg Cyclone Furnace instantly brings these unique advantages to your plant:

1 Perfect uniformity and rapid heating regardless of temperature or density of loading.

2 Ability to withstand terrific abuse.

3 Elimination of production delay because elements can be replaced without cooling furnace.

4 Standard fan motor easily replaced from dealer's stock.

5 Minimum floor space and head room requirements.

6 Accurate temperature control and shortest possible heating time.

For tempering and other heating operations up to 1250° F., Cyclones are cutting costs, turning out better work and standing up under a terrific war production beating. You can get these production accuracies and economies, too. Wide range of standard sizes, either gas or electric. Write us today for full information.

LINDBERG ENGINEERING COMPANY
2453 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

ARMY E NAVY

Lindberg FURNACES

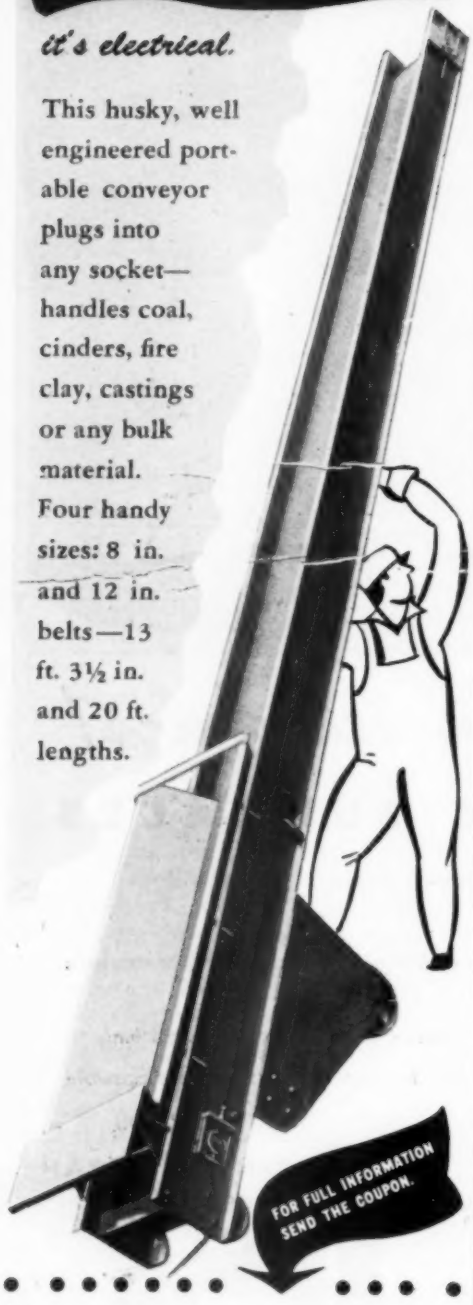
SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

UNLOAD SAND QUICKER—
SAVE MAN-POWER—
CUT COST—

CON·VAY·IT

it's electrical.

This husky, well engineered portable conveyor plugs into any socket—handles coal, cinders, fire clay, castings or any bulk material. Four handy sizes: 8 in. and 12 in. belts—13 ft. 3½ in. and 20 ft. lengths.



FOR FULL INFORMATION SEND THE COUPON.

AMERICAN CONVEYOR COMPANY
2427 INDIANA AVENUE • CHICAGO 16, ILL.

Please send facts about CON-VAY-IT . . . specifications, delivery information, prices.

NAME_____

ADDRESS_____

_____

FIRM_____

(*Continued from page 250*)

metal stock frequently must be shifted in the course of the work. Hand trucks, power trucks, hoists, cranes, and conveyers are used for much of this work, but a great deal of the material moving must be done by hand. In many plants space is at a premium and much of the moving is handicapped by crowded work spaces. It is often necessary for cranes to carry material over the heads of workmen and to set it down in spaces where there is little room for workers to stand clear. As a result, men are injured by being struck by the materials and equipment.

Somewhat different from the ordinary danger of being struck by moving materials is the hazard of being struck by molten metal which may splash or spill from ladles or molds. Injuries resulting from contact with this material are generally severe burns rather than cuts, bruises, or crushing injuries such as result from being struck by other objects. All foundrymen who handle molten metal and all others who work in the vicinity of such operations face this hazard.

Ladles May Overflow

Failure to properly control the flow of metal either in filling the ladle or in pouring from the ladle may cause an overflow. Moisture in the ladle or in the mold, or pent-up gases in the mold, may cause metal to spatter. Unsteady handling of the ladle may cause some of the metal to splash or spill. Uneven floors and material or equipment left in aisles or work spaces often present tripping and bumping hazards which can easily result in spilling the ladle's contents. Over 6 per cent of all the injuries in the gray iron and malleable iron foundries resulted from workers being struck by molten metal. It is pertinent to note, however, that accidents of this type were much less common in steel foundries where hand ladles are not widely used.

In grinding castings great quantities of metal particles from the material being ground and particles from the grinding wheel are thrown off from the point of operation. The wheel imparts a terrific velocity to these particles and frequently they fly considerable distances from the point of operation, endangering everyone in the vicinity. Stationary grinders generally can be guarded by transparent shields and exhaust devices which intercept most of the particles before they travel far, but only comparatively small castings can be ground on such equipment. For large castings it usually is necessary to use portable or swinging grinders, which are much more difficult to guard. The chief danger from these particles is that they may strike and imbed themselves in the eyes of the operator or other nearby workers. About 4 per cent of all the foundry accidents were of this type.

Chipping operations similarly throw off bits of metal which constitute a serious eye hazard. However, because the chips thrown off are larger and the resulting injuries are generally more severe there is a tendency to be more careful in the use of goggles around chipping operations than is the case in respect to grinding. In the gray iron foundries "struck by" accidents arising from chipping operations were few, amounting to less than 1 per cent of the total. In the malleable iron foundries, however, the proportion amounted to 1.9 per cent and in steel foundries it was 2.5 per cent.

Slips (not falls) and overexertion.—Loose sand on working surfaces caused a majority of the reported slipping accidents. Many of these cases occurred when the workers were carrying materials or were attempting to push or pull heavy objects into position. However, the number of slips which resulted in disabilities was relatively small, compared with the number of injuries arising from overexertion in lifting or moving materials or in using tools and equipment. Overexertion was responsible for 18 per cent of the disabilities in malleable iron foundries and about 13 per cent of those which occurred in steel foundries. Generally, these injuries resulted from lifting excessive weights, lifting with the back instead of the legs, lifting in cramped or awkward positions, or from failure of lifting teams to act in unison.

Caught in, on, or between objects.—Accidents of the caught in, on, or between type accounted for about 7 per cent of the disabling injuries in malleable iron foundries, nearly 10 per cent of the injuries in gray iron foundries, and about 12 per cent of those recorded for steel foundries. The majority of these were crushing injuries, such as fingers and hands pinched between materials or caught in the chains used in rigging crane loads; persons crushed between crane loads and stationary objects or between vehicles and stationary objects; and hands and fingers caught in unguarded gears, pulleys or other parts of moving machinery.

Striking against.—Accidents in which the injured person bumped into some stationary object such as machines, castings, molds, etc., accounted for nearly 10 per cent of the disabilities in each of the three types of foundries. In many cases these accidents were the direct result of poor housekeeping, which in turn could be traced to a lack of sufficient space for the proper storage and placement of materials and equipment.

Falls.—About 5 per cent of all the disabilities were the result of falls. In the gray iron and malleable iron foundries the great majority of these cases were tripping accidents in which the injured person fell only to the surface on which he was working. In the steel foundries, however, falls from one elevation to another were nearly as numerous as falls on the same level.

Other types of accidents.—Contact with temperature extremes, primarily consisting of touching hot castings, and

(*Concluded on page 254*)

SETTING THE PACE!

Mid-West's new tool room grinding wheel sets the pace in quality for the entire Mid-West line. Engineered for the toughest abrasive jobs in the shop, it cuts cool and fast, leaving the finest finishes.

Matching this pace are all other items in the Mid-West family—honing stones, sharpening stones, sandpapers, wheel dressers and abrasive specialties—each a product of the highest engineered quality.

Let one of our staff of field engineers analyze your abrasive problem and advise you. Prompt delivery on all items.

MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

Owosso, Mich. • 1960 E. Milwaukee, Detroit 11, Mich. • Rochester, Pa.

Mid-West Abrasive Co.
1960 E. Milwaukee Ave., Detroit 11, Michigan

Please send me your complete data book on: 1 ( ) Grinding Wheels; 2 ( ) Sandpapers; 3 ( ) Superfinish Stones. (Check the book or books desired.)

NAME_____

ADDRESS_____

...but where is the Dust?

This foundry is a good place to work—*clean, cool, comfortable.* Gone are dust from the riddles and heat and fumes from furnaces, ladles, molds. Modern Propellair ventilation whisks away the humid air and dirt; assures a clean and *healthful* atmosphere for greater output, better work, fewer man-hours lost.

FRESH AIR, EVERYWHERE

The combination ventilating system of hoods, ducts, and roof exhausts serves every operation and department. It gathers in stray whisps of smoke and dust from every source. The foundry air is *fresh as outdoors*, and vision is *clear.*

HELPS KEEP QUALITY HIGH

"Propellair fans have been a great help to us in maintaining high quality," says the Superintendent. Why don't *you* find out how and *why* these marvels of air movement can do the same for *you?*

Direct-Connected Type CD Fan With 4-Blade Style "C" Propeller

Yours Free

Send for Catalog No. 10F. Learn how Propellair airfoil fans can help you solve air-moving problems. There are sizes and mounting types for every foundry need. Fifteen years of propeller-fan specialization, and sales engineers in 25 cities, are at your service.

"MOVING AIR IS OUR BUSINESS"

PROPELLAIR INC. SPRINGFIELD · OHIO

(*Concluded from page* 252)

explosions in molds and pits when water and molten metal came into contact each produced slightly over 1 per cent of the injuries. Injuries resulting from the inhalation, absorption, or ingestion of dusts (including silica), gases, chemicals, and harmful light rays were very few in the gray iron foundries. In the malleable iron foundries, however, they constituted 1.7 per cent and in the steel foundries 2.7 per cent.

(*To be concluded next issue*)

MAGNESIUM SAND CASTINGS

(*Continued from page* 95)

speed. After checking the pouring and visual inspection of the first casting, the sprue area should be altered, if necessary, to correct the speed.

2. The following benefits result from using the correct pouring time:

(a) The advantage of the lowest temperature, thereby reducing the amount of burning.

(b) It reduces the amount of misruns and cold shuts. Oxide formed after passing through the sprue is always caught in the upper side of the runner because of the difference in height of the runner and gate.

After gating a casting, it is possible to watch it being poured and know exactly what is happening to the metal from the moment it strikes the sprue until it comes up the risers.

Gates are decided upon by our foundry engineers. Who are our foundry engineers? Who is responsible? Well, the responsibility for production and quality lies upon the shoulders of our general superintendent and the superintendents and supervisors of our foundries. Yes, we want production but quality, above all, comes before production. Their job is to obtain quality and then production.

In order to get the best results with this gating method, all other operations must be controlled, such as the melting, molding and core departments.

VII. Risers

1. *Use of Risers*

(a) Risers are used to feed heavy sections. Risers should be made tapered, large at top, smaller at bottom where section is fed allowing 1/16 to ⅛-inch identification mark where riser should be sawed or chipped off.

(b) We prefer to use risers instead of chills wherever possible to insure soundness of section to be fed.

VIII. Chills

1. *Iron Chills*

(a) Chills are used where risers cannot be applied. We use iron chills. Chills that are used on patterns and left in green sand molds are painted with red talc mixture composed of tetrachloride, paraffin and talc. This mixture is applied on chills which are dried and then sent to the molding department for use. Chills that are used for cores are painted after core is baked and again dried before use. Faces of chills are grooved or contain a countersunk hole to eliminate any blow-off chills.

Foundrymen are probably saying to themselves—"If we follow this method, will we get good results?" Well, we have found it so, if all operations are controlled, such as melting. All foundrymen know the melting procedure. You must have control. You have to have uniformity day in and day out. I do not think that the control men in the melting department should report to the foundry superintendent. They should report to the laboratory. It is the laboratory's responsibility to see that the procedure is followed, and that metal analysis is correct. The management of any foundry, whether manager, assistant manager or general superintendent, should be very much interested in what is going on. He should ask day in and day out, "Are we controlling all procedure, and if not, why?" If you don't control these operations, you are always going to run into trouble.

The accompanying sketches will illustrate in general our idea on area gating.

Fig. 1 illustrates an inside gate for a large casting. Using the area of the sprue at the choke *A* as a unit of one, you will note that the area of *each* of the three feeders *B* from the sprue choke to the ring runner is one, or a total of three.

Divide Into Three Feeders

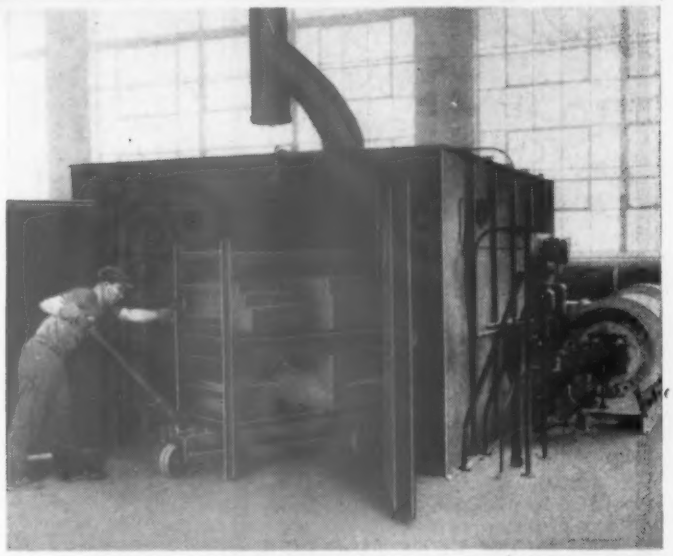
In other words, the flow of metal through the choke divides into three feeders, each feeder having the same volume capacity as the sprue at the choke. It should be noted that the effective screen area is four (4) to five (5) times the choke area of the sprue in order to allow enough metal to flow into the feeders and runners.

The three feeders *B* connect with the ring runner *C*. The cross section of the ring runner at any given point is one-half the area of a feeder, because the metal running from the feeder into the ring runner divides two ways at each junction of a feeder and the runner. The total cross-sectional area of the runner *C* is then equal to the total cross-sectional area of the three feeders *B* (½ × 6 = 3) and three times the cross-sectional area of the sprue at the choke *A*. The cross-sectional area of each gate *D* from the runner into the casting is one-eighth the total cross-sectional area of the runner and one-eighth the total cross-sectional area of each feeder.

Since there are 24 gates, each having a cross-sectional area of one-eighth, the total cross-sectional area of all the gates (⅛ × 24 = 3) is equal to the total cross-sectional area of the runner and the three feeders. The area gate, therefore, is composed of a sprue which is one-third the total cross-sectional area of all the gates, three feeders which are equal to the total cross-sectional area of all the gates, and a runner whose cross-section-

(*Concluded on page* 256)

WHERE EXPERIENCE IS OF FIRST IMPORTANCE



There are few pieces of industrial equipment in the design and manufacture of which first hand experience and "know how" are of such vital importance as in industrial ovens. Factors which are seemingly negligible to the inexperienced often have far-reaching effects in the actual performance of an oven when finally put into service. Seldom do any two ovens, even in the same plant, operate under identical conditions. Allowance must be made for all the variables if maximum baking speed and economy are to be realized.

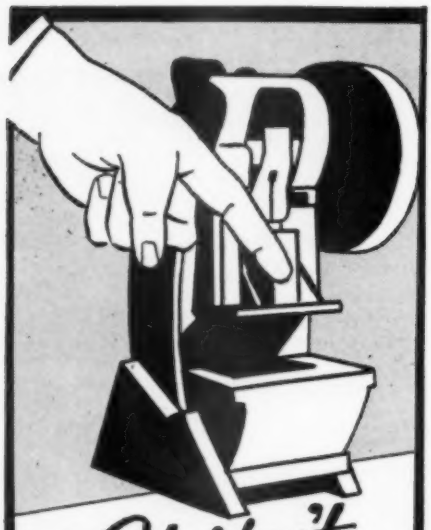
In addition, the oven design must take into consideration the probable future changes in the user's product and be flexible enough to accommodate such changes.

If you want maximum oven effectiveness and highest baking speed, take advantage of the broad experience of oven engineers who devote all of their effort to this branch of engineering and have proved their ability.

YOUNG BROTHERS COMPANY

6508 MACK AVENUE **DETROIT 7, MICHIGAN**

YBCo



It isn't necessary

TO TEAR DOWN A MACHINE TO WELD A BROKEN CAST-IRON PART!

NO PREHEATING IS REQUIRED WHEN YOU WELD CAST-IRON WITH

AGILE

YELLOW ELECTRODES

AGILE Yellow Electrodes have rapid fusion qualities and the weld metal has a soft fine dense grain that possesses greater strength than cast-iron. The weld metal is file soft and easily machineable.

AMERICAN AGILE CORPORATION

5806 HOUGH AVENUE
CLEVELAND 3, OHIO

AGILE ACTARC

*Send for free Literature

(*Concluded from page 254*)

al area is equal to the total cross-sectional area of all the gates. This can be expressed as a ratio of 1:3:3.

Fig. 2 is an illustration of an area gate for a two-ladle pouring set-up. It also can be used as an illustration for a one-ladle pouring set-up, using the same type gate.

Using the one sprue pouring set-up (use the values 1 and 1 and ¼), the cross-sectional area of the sprue *A* is one. The total cross-sectional area of the runner *B* is two (1 plus 1 equals 2). Here again the metal passing from the sprue to the runner divides or flows two ways into a cross-sectional area at either side of the sprue, each side being the same cross-sectional area as the sprue cross-sectional area. The cross-sectional area of each gate from the runner into the casting is one-quarter of the total cross-sectional area of sprue, and one-quarter of the total cross-sectional area of each half of the runner.

This area gate, therefore, is composed of a choke at sprue which is one-half the total cross-sectional area of all the gates and one-half the total cross-sectional area of the runner. The total cross-sectional area of the runner is equal to the total cross-sectional area of all the gates. This can be expressed as a ratio of 1:2:2.

Reduce Choke Sprue Area

Using the two sprue pouring set-up (use the values ½ and ¼), it will be noted that the ratio remains the same because the choke sprue area is reduced to one-half in each sprue and the runner area is reduced to one-half also. The total sprue area is then ½ plus ½ equals 1; the total runner is then ½ plus ½ plus ½ plus ½ equals two. The total gate area remains the same 8 x ¼ equals two. This can also be expressed as a ratio of 1:2:2.

Again it must be remembered that the effective screen areas for both the one pouring set-up and two pouring set-up is four (4) to five (5) times the choke area, the same as in Fig. 1.

Fig. 3 illustrates an area gate for a deep casting. The cross-sectional area of the sprue at *A* is one. The cross-sectional area of the half circle runner at *B* is equal to the sprue area one. The cross-sectional area of each vertical runner at *C* is one. The cross-sectional area of the bottom ring runner *D* at any given point is ½ because the metal divides into two directions when flowing from the vertical runner into the ring runner.

The cross-sectional area of each gate *E* from the bottom ring runner to the casting is one-half. This area gate is composed of a sprue of which the cross-sectional area is half the total cross-sectional area of the bottom runner (½ plus ½ plus ½ plus ½ equals two) and ½ the total cross-sectional area of all the gates (½ plus ½ plus ½ plus ½ equals 2). This can also be expressed as a ratio of 1:2:2. The screen area at the sprue choke is again four to five times the choke area at the sprue which is standard practice in our foundries.

These sketches will give an idea of just what is meant by standardized gating and risering. I do not think that the magnesium foundry practice is any more difficult than any other foundry practice. In the case of aluminum one has different alloys, different characteristics, and one must apply different gatings and riser one alloy more than others. If you think you have trouble with magnesium because it is a new metal, get that out of your mind because if you follow the procedures and follow them precisely, you should obtain excellent results. Be sure to maintain control day in and day out and your troubles will be minimized. On some of our operations, I personally receive reports every hour and feel that it is worth while because the results are more than satisfactory.

There will always be scrap, as new employes coming in the plant are unfamiliar with the foundry work. You will get sand in molds or probably misplacement of cores. That is supervision's responsibility, but if you follow the procedures described herein and by others, you will rectify most of your troubles. By following these suggestions, we will all increase our production.

Schedules Course in Quality Control

An 8-day tuition-free course in "Quality Control by Statistical Methods" will be given, beginning May 16, by the University of Iowa, Iowa City, at the College of Engineering, in co-operation with the War Production Board and the United States Office of Education under the Engineering, Science and Management War Training Program.

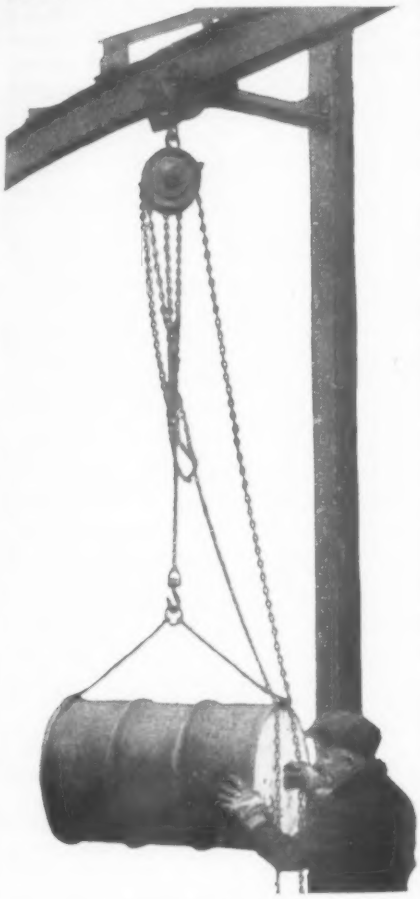
The program consists of a series of conferences, lectures, and laboratory periods for executives or employees of plants engaged in any type of production related to the war effort, and officers and employees of the armed forces.

Statistical methods of quality control developed by leading industries toward improving quality and economies in the use of labor and materials, decreasing rejection and inspection costs, and improving producer-consumer relations are among the points covered. Information concerning applications may be secured from the university.

Labor Legislation Guide Available

"A Guide to Labor Legislation," a bulletin intended for use by supervisors, shop stewards, and other representatives of labor and management, has been prepared by the U. S. Department of Labor and is available from the Government Printing Office, Washington 25, at 25 cents a copy. It contains a brief summary of federal labor relations, indicating the most important points in the various laws.

MULTIPLY MANPOWER with READING HOISTS



unload faster
move loads easier

The multiple gear Reading Hoist used on this job gives maximum speed of load movement.

The sealed-in-oil gear unit permits operation outdoors with complete safety. Other models of Reading Hoists are available to solve materials handling jobs where lifting power is most important or where easy portability of the hoist is needed. Capacities range from ¼ to 20 tons for trolley, hook, post or jib mountings.

See your nearest distributor or write us about your materials handling problem and we will be glad to make a recommendation.

READING CHAIN & BLOCK CORPORATION
2138 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

NEW TRADE PUBLICATIONS

INDUCTION HEATING—Ajax Electrothermic Corp., Trenton 5, N. J., offers a 28-page illustrated bulletin, No. 25, which gives a history and description of induction heating and modern applications, including spark-gap converters, tilting coil, lift-coil, vacuum and pressure furnaces.

ELECTRODES—Bulletin W-2, issued by Ampco Metal Inc., Milwaukee 4, describes various types of electrodes for metallic arc, carbon arc, and oxy-acetylene welding. Bulletin W-3 describes in detail five standard types of aluminum bronze welding rods, their chemical composition and physical properties, as well as their various uses.

CONVEYORS—Chain Belt Co., Milwaukee 4, has available a new bulletin, No. 462, which describes a line of apron and pan feeders and conveyors for handling coal, coke, ore, cement, rock, chemicals and bulk parts. Design details, cross sections, capacity tables and specifications tabulated for quick comparison are included.

RESISTANCE THERMOMETER — Bailey Meter Co., Cleveland 10, has issued Bulletin 230-A which lists outstanding features of indicating, recording and controlling models of electronic resistance thermometers. The bulletin describes electronic detector and motor control, gives definite information on ranges, power supply required, speed of response, accuracy, sensitivity, installation, standard chart ranges, measuring circuits, etc.

AIRBLAST EQUIPMENT—American Foundry Equipment Co., Mishawaka, Ind., has published a catalog describing a line of airblast equipment which includes rooms, cabinets, tanks, suction guns, nozzles and accessories.

SETTLING AND DEWATERING EQUIPMENT—Bulletin No. 1144, issued by Claud B. Schneible Co., Detroit 16, describes a line of settling and dewatering equipment adapted to product recovery systems, ore and sand washing systems, slag, chemical and industrial wastes. Tanks of various types and capacities—rectangular, conveyor, truck, railroad track, concrete and skimmer—are shown.

INSULATING VARNISH — Dow Corning Corp., Midland, Mich., offers an 8-page booklet which describes the properties of a high temperature silicone electrical insulating varnish that is heat and moisture resistant and recommended as a coating and binder for wire, asbestos cloth and sleeving. Use as an adhesive and impregnating and sealing varnish for filling voids and waterproofing the assembled machine is also recommended.

LEATHER BELTING—A new 56-page leather belting manual, published by Graton & Knight Co., Worcester 4, Mass., contains information on tannages, belt dimensions, comparison of efficiency and cost of multiple v-belt drives and flat drives, installation of flat leather belts, and increased power and service

Where the Old Record was Only 4 Hours when *Working* in Heavy, Oily Sand

Ever watch a Speedmullor speedily mulling a batch of sand in a steel foundry? In one Mid-Western installation, the sand prepared is so heavy and oily that formerly the plows wore out in 4 hours. The abrasion encountered was most severe. However, when the plows were protected with a wear-resistant coating of Coast Metals Hard-Facing, they lasted 30 hours! Including the cost of weld rod metal, welder's time and labor for changing plow, the dollars and cents saving is surprisingly large.

Innumerable other companies also are telling us of similar economies in longer equipment life, fewer shutdowns, less idle labor, salvage of worn parts . . . savings which Coast Metals Hard-Facing is making possible on mud gun screws, tap hole augers, pug mill paddles, gag press hammers, shear blades, guides, rolls, punches and a wide variety of other important plant equipment.

Coast Metals Hard-Facing can be easily, quickly applied to the surfaces, edges and points of new or old parts, machinery or equipment made of any ferrous metal including manganese steel, alloy steel, cast iron or chilled iron. Our new pamphlet, S-101, goes into full detail. Write for your copy today.

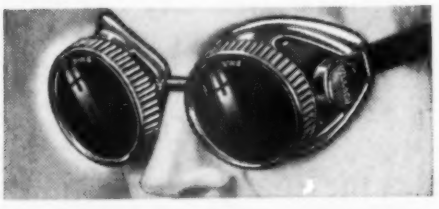
COAST METALS, INC.
Plant and General Offices: Canton, Ohio
Executive Offices: New York, N. Y.

COAST METALS
hard-facing weld rods
MAKE YOUR EQUIPMENT LAST LONGER

WILLSON-WELD LENS FEATURES

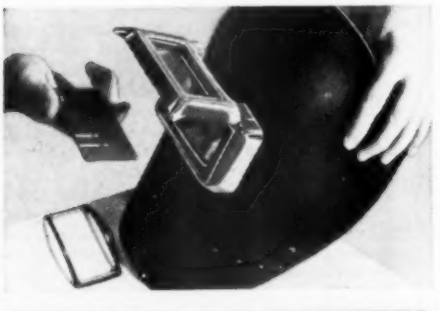
MARKED

When you see the WW trademark on a Willson-Weld lens, it's your assurance of dependable eye protection for welders. The shade number on each lens, determined by individual photometer test, permits easy selection. Never take a chance on unidentified welding glass.



MATCHED

The WW also means that for either goggles or helmets, Willson-Weld lenses are matched to Federal specifications for reducing intensity and glare of visible light and filtering out dangerous ultra-violet and infra-red rays.



REPLACEABLE

Replaceable clear cover glasses protect Willson-Weld lenses from pitting. Lens and cover glass economical to replace. Lens easily changed for different types of welding.

For welding eye protection consult your Willson distributor or write direct to Dept. FD-8.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON

PRODUCTS INCORPORATED

READING, PA., U.S.A.

from belts. Selection tables for automatic tension leather belt drives and a catalog section of leather belting and accessories are included.

WIRE ROPE—Preformed Wire Rope Information Bureau, Chicago 11, has available upon request a 36-page book which illustrates pictorially the uses to which wire rope has been put in World War II. Official Army and Navy photographs show the widespread use of wire rope in the operation of ships, military vehicles, machines and devices.

LATHES—South Bend Lathe Works, South Bend 22, Ind., has issued the 43rd edition of its book, "How To Run A Lathe," containing latest information on operation and care of metalworking lathes. The operation of lathe units, grinding cutter bits, making accurate measurements, plain turning, cutting screw threads and other subjects are covered. Postpaid copies are available with paper covers for 25c, or with leatherette covers for 75c in stamps.

BLOWERS AND EXHAUSTERS — Principle of operation and the design and construction features of rotary positive displacement type blowers and exhausters are described in a 16-page bulletin, No. P100, obtainable from Pottstown Blower Co., Division of Allen Billmyre Co., Mamaroneck, N. Y. It is designed for services where volume of air or gas discharged must remain constant under variations in pressure or vacuum.

ELECTRONIC PRODUCTS — North American Philips Co. Inc., New York 17, has available an 8-page catalogue, GCI-5-2-45, which describes cathode-ray, power and amplifier tubes, oscillator plates, X-ray inspection units, spectrometers, diffraction equipment, X-ray analysis units, etc. A 12-page booklet, IXD-II-44-10 describes this company's X-ray diffraction apparatus for identifying, comparing and analyzing materials.

FIRE EXTINGUISHERS—A 12-page folder describing and illustrating seven types of fire extinguishers and the classes of fire each is designed to combat, is offered by General Detroit Corp., Detroit 7. Construction specifications and Underwriters Laboratories classifications are included.

ARC FURNACE EQUIPMENT — General Electric Co., Schnectady, N. Y., has published an illustrated 20-page booklet, GEA-4246, containing information covering the operation of electric furnaces. The importance of using properly co-ordinated electric equipment is stressed. Control, switchgear and transformer units are described in detail, and dimensions given.

V-BELT DRIVES — An unusually complete V-belt drive catalog, B6051E, is offered by Allis-Chalmers Mfg. Co., Milwaukee 1, which contains all of the required information to make correct drive selections reduced to handy charts, tables and drawings. A new sheave, designed for fast, easy mounting and dismounting, and the econograph method of drive selections are also described.

GAS CUTTING TIPS—A new 12-page color bulletin, No. ADG-2008, which describes high speed machine gas cutting tips, has been published by Air Reduction Sales Co., New York 17. Cross-sectional drawings and photographs show how the company's new tips release a high velocity stream of oxygen to cut a narrower path or kerf than the standard cutting tips, with no increase in gas consumption per inch of cutting.

AIR COMPRESSORS—Ingersoll-Rand Co., 11 Broadway, New York 4, has available a colorful 24-page catalog, Form 1011, showing what is being done with small compressors or with a small amount of air from a shop air line. Use of reciprocating and rotary air tools is described, as well as application of pressure with compressed air, vacuum and jet applications, etc. Form 117, a pocket-size folder, illustrates photographically air tool operation on construction, demolition and plant maintenance jobs. Accessories such as hose couplings, air line lubricators, steels and jackbits are illustrated.

ANTI-FRICTION BEARINGS—Anti-Friction Bearing Manufacturers Association Inc., 60 East Forty-Second street, New York, has compiled a manual containing standard specification data on the manufacture of ball and roller bearings, a uniform basic part numbering system, standardized workmanship, inspection, tests, and a simplified form of tabulated dimensional data. This data has been prepared to eliminate many separate specifications and to assist designers in the application of standard bearings.

VIBRO-ISOLATOR—Catalog SL 500, a 4-page bulletin recently published by Korfund Co. Inc., Long Island City 1, N. Y., describes in detail a newly developed vibro-isolator, designed to absorb vibration in all directions, for use on punch presses, shears, hammers, grinders, shakers, generators, material testing equipment etc. Complete data regarding the rated loads, weights and dimensions in six basic sizes are given.

CENTRIFUGAL PUMPS—A handbook entitled "Self-Priming Centrifugal Pumps," isssued by Marlow Pumps, Ridgewood, N. J., sets forth the principles of centrifugal action, the physics of pumping and the evolution of self-priming centrifugal pumps. The booklet explains the differences between the types of self-priming centrifugals, points out where they can be used for best effect, and details how to install and care for them.

FOUNDRY EQUIPMENT—A folder that points out how foundries utilize the welded steel process in the construction of much of their equipment has been issued by Central Boiler & Mfg. Co., Detroit 11. Illustrated with pictures of ladles, sand boxes, flasks, tumbling mills etc., constructed of welded steel, the folder is available upon request.

OPEN STEEL FLOORING—An 8-page bulletin recently published by the National Machine & Foundry Co., Pittsburgh 22, describes the most recent development in open steel flooring, grating and stair treads. Table of safe loads and general specifications are included.